

STD DWG	—	—	
SHIP	REV	SHIPCK BY	DT
SHIP APPLICABILITY			

CONTRACT NO N00140-85-D-BA63
 FSCM NO
 MARINE SYSTEMS CORP
 582 E STREET
 BOSTON, MA, 02210

PREPARED	G.W.B.	DATE 5/15/87
CHECKED	G. BETTS	5/18/87
ENGINEER	C.R. Shayu	6/30/87
APPROVED	J.E. Stevens	6/30/87

AUTHORITY:

AUTH:

A PROOFING SHIPCHECK HAS
 BEEN CONDUCTED ON THE
 SHIP INDICATED IN NOTE 1
 AND THIS DRAWING IS CERT-
 IFIED AS BEING ACCURATE.

PLANNING YARD	DATE
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PUGET SOUND
 NAVAL SHIPYARD
 DETACHMENT

BOSTON, MA 02210-2144

DEPARTMENT OF THE NAVY
 NAVAL SEA SYSTEMS COMMAND
 WASHINGTON D.C. 02382

PREPARED	M.S.C.	DATE
CHECKED	WC	12/7/87
ENGINEER	W. Carlson	12/7/87
APPROVED	R. BARROS	

VENTILATION INSTRUCTIONS

ACCEPTED FOR NAVSEA

R. Barros 2/27/91

APPROVED BY NAVSEA
 NOT REQUIRED

VENTILATION INSTRUCTIONS				
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SIZE	FSCM NO.	WT GRP	NAVSEA DRAWING NO.	REV
A	53711	501	6265454	—

SCALE: NONE

SHEET 1 OF 52

REVISIONS

REV	ZONE	DESCRIPTION	BY	DATE	APPROVED

[illegible]

-	N/A								
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REV	SHIPALT NUMBER	WT GP	WT (LBS)	I R XI OR XR	VCG REF BL	LCG REF	F OR A	TCG REF CL	P S OR O	VAL BY
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LEVERS IN FEET TO THE NEAREST TENTH OF A FOOT
USE SEPARATE LINES FOR EACH WT GRP, S/A, REV, WT INSTL, WT RMV.
I = INSTALL, R = REMOVE, XI = LOAD ITEM INSTALLED, XR = LOAD ITEM
REMOVED. F = FWD, A = AFT, P = PORT, S = STBD, O = C

	SIZE	FSCM NO.	WT GRP	NAVSEA DRAWING NO.	REV
	A	53711	50I	6265454	-
	SCALE: NONE				SHEET 2

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ABBREVIATIONS

VOL	= VOLUME
SPLY	= SUPPLY
EXH	= EXHAUST
WMS	= WIRE MESH SCREEN
FO	= FLAT OVAL
TERM	= TERMINAL
VEL	= VELOCITY
CLO	= CLOSURE
GALV	= GALVANIZED
ROC	= RATE OF CHANGE
SYS	= SYSTEM
WT	= WATERTIGHT
NWT	= NONWATERTIGHT
WP	= WATERPROOF
DP	= DRIPROOF
NS	= NATURAL SUPPLY
NE	= NATURAL EXHAUST
OP	= ORIFICE PLATE
BO	= BLOW OUT
RECIRC	= RECIRCULATING
RC	= ROUND CORNERS
CC	= COOLING COIL
RHTR	= REHEATER
PHTR	= PREHEATER
CHTR	= COMBINATION HEATER
VT	= VANED TURN
CW	= CLOCKWISE
CCW	= COUNTER-CLOCKWISE
FA	= FLAME ARRESTER
THERMO	= THERMOSTAT
CRES	= CORROSION RESISTANT STEEL
CFM	= CUBIC FEET PER MINUTE
VOC	= VOLUME OF COMPARTMENT
PTC	= PORTABLE TEST COVER
	= HULL FOUNDATION REQUIRED
A/C	= AIR CONDITIONED
AT	= AIR TIGHT
DIA	= DIAMETER
R	= RADIUS
AP	= ACCESS PLATE

REFERENCES

NO.	TITLE	NAVSEA DRAWING NO
1	GENERAL SPECIFICATIONS FOR OVERHAUL OF SURFACE SHIPS OF THE U S NAVY	NAVSEA S9AAO-AB-GOS-010
2	VENTILATION TERMINALS	S3801-83693
3	VENTILATION STANDARD FLANGES	S3801-83694
4	VENTILATION CLOSURE WATERTIGHT MOD."R" ROUND	805-1749102
5	VENTILATION CLOSURE WATERTIGHT MOD "K" FLAT OVAL	805-1749103
6	VALVE, FLANGED GATE, FOR VENTILATION (TYPE A)	S4824-841350
7	VENTILATION STD. HIGH EFFICIENCY FILTER INSTL.	501-1131922
8	TEMPERATURE CONTROL SYS. 2PD FOR AIR CONDIONING.	805-1749054
9	HUMIDITY LIMIT OF 2PD CONTROL SYS. FOR AIR COND.	805-1749055
10	TEMPERATURE AND HUMIDITY CONTROL SYS. FOR A/C	805-1749056
11	COOLING COILS GRAVITY TYPE	S3803-532636
12	VENTILATION STANDARD FAN FOUNDATIONS	S3801-1546597
13	FOUNDATIONS FOR GRAVITY COILS	113-4833708
14	MOUNTING REQ. FOR SMALL EQ. IN SHOCK AREA	113-5377425
15	VENTILATION HEATER	S3802-66970
16	TEMPERATURE REGULATOR FOR VENTILATION HEATER	S3802-860327
17	CONVECTION HEATER	S3802-921624
18	VENTILATION WEATHERTIGHT COVER	S3801-12908
19	BELLMOUTH INTAKE	S3801-451223
20	CIRCULAR DIFFUSING TERMINAL	S3801-690702
21	VANEAXIAL FAN	S3801-921984
22	TUBEAXIAL FAN (TYPE L)	S3801-925368
23	CENTRIFUGAL FAN	803-5001058
24	SHOCK "A" HANGERS FOR VENT DUCTS AND HEATERS	805-2539041
25	AIR FILTERS	S3801-1170895
26	FLAME ARRESTOR AND FILTER ASSEMBLY	S3801-1231181
27	THERMAL INSULATION FOR COMP'T INSTL AND DETAILS	805-1749057
28	THERMAL INSULATION FOR DUCTWORK	805-1749058
29	FASTENINGS FOR HULL THERMAL INSULATION	805-1343696
30	COOLING COILS DUCT, CONSTRUCTION DET'S 50 SERIES	805-1310894
31	COOLING COILS DUCT CLASS DW AND DF 50 SERIES	805-1311397
32	UNIT COOLERS CLASS UW AND UF 50 SERIES	805-1311398
33	COOLING COILS REFRIGERANT CIRCUITS 50 SERIES	805-1311399
34	VENTILATION UNIT HEATER	S3802-521735
35	GREASE INTERCEPTOR HOOD	805-1749099
36	VENTILATION STANDARD ACCESS PLATES	501-2139135
37	VANED TURNS	S3801-660576
38	ACOUSTIC INSULATION FOR COMPARTMENTS AND DUCTS	S3901-921905
39	INSTALLATION DETAILS ACOUSTIC INSUL FOR COMP'T	805-2483105
40	INSULATION FOR FIRE ZONE BULKHEADS	803-5184182

REFERENCES (CONT.)

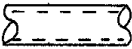
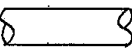
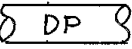
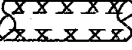
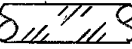

<u>NO.</u>	<u>TITLE</u>	<u>NAVSEA DRAWING NO.</u>
41	PERFORMANCE CURVES FOR VANEAXIAL FANS	805-921984
42	LABEL PLATE TYPES	810-1874109
43	SUPPORTS FOR THERMOSTATIC CONTROLS	S3802-665299
44	COOLING COILS SIZE 57 AND 58	803-5001031
45	LIGHT EXCLUDING HOOD	501-2134738
46	VENTILATION STANDARD FIRE DAMPER	501-2139140
47	FLAT OVAL ACCESS COVER	501-1131916
48	VENTILATION TERMINALS TYPE "E" ADJUSTABLE	804-860481
49	AIR FILTER HOUSING (COOLING COILS)	803-5001044
50	TEMPERATURE AND HUMIDITY CONTROL SYS. FOR A/C	805-2482948
51	VENTILATION, FIRE DAMPERS GRADE "A" SHOCK	805-3330791
52	ROUND ACCESS COVER FOR NWT DUCT 6" DIA. Q.O.TYPE	805-1363772
53	ROUND ACCESS COVER FOR NWT DUCT 8" DIA. Q.O.TYPE	805-1363773
54	ROUND ACCESS COVER FOR NWT DUCT 12" DIA. Q.O.TYPE	805-1363774
55	ROUND ACCESS COVER FOR NWT DUCT DET. AND LIST MAT	805-1363775
56	ROUND ACCESS COVER FOR NWT DUCT IN ROUND DUCT	805-1363776
57	AIRFLOW INDICATOR AND ALARM SYSTEM	815-1853145
58	ARMORED VENT TURNS THROUGH ARMORED BULKHEADS	117-5610792
59	AIR FILTER GAGE	805-1577080
60	TYPE PLAN-INSULATION INSTALLATION AND DETAILS	S3901-1223775
61	PERFORMANCE CURVES FOR TUBEAXIAL FANS	810-925368
62	ACOUSTIC INSULATION FOR COMPARTMENTS	804-5773931
63	THERMAL INSULATION AND ACOUSTIC ABSORPTIVE TREATMENT FOR TRUNKS AND DUCTS	804-5773932
64	FILTER SYSTEM, NAVY CBR	NSWG-07609-SK66640
65	STANDARD FOUNDATIONS FOR COOLING COILS AND UNIT COOLERS	S1112-2201127
66	QUICK-ACTING ACCESS COVERS	803-6397256
67	HOOD-EXHAUST FOR DISHWASHER	803-6397386

GENERAL NOTES

SPECIAL NOTE

- 1 WHEN THESE INSTRUCTIONS ARE INVOKED BY ISSUANCE OF THE VENTILATION AND AIR CONDITIONING ARRANGEMENT DRAWINGS, PROCEDURES AND REFERENCES DESIGNATED HEREON SHALL BE UTILIZED UNLESS EXCEPTIONS ARE MADE BY RESPONSIBLE AUTHORITY.

HVAC DESIGN AND CONSTRUCTION NOTES

- 1 DUCTS INDICATED THUS:  ARE TO BE WT
 ARE TO BE NWT (CONSIDERED AT)
 ARE TO BE DRIPPROOF (DP)
 ARE TO BE SOUNDPROOFED BY ACOUSTIC ABSORPTIVE TREATMENT
 ARE TO BE THERMAL INSULATED
 ARE TO BE REMOVED
- 2 "X" DENOTES THE DISTANCE FROM CENTERLINE OF DUCT OR FITTING TO THE UNDERSIDE OF DECK ABOVE.
"A" DENOTES THE DISTANCE FROM THE TOP OF THE DUCT OR FITTING TO THE UNDERSIDE OF THE DECK ABOVE.
"Y" DENOTES THE DISTANCE FROM CENTERLINE OF A DUCT OR FITTING TO THE TOP SIDE OF THE DECK BELOW.
"B" DENOTES THE DISTANCE FROM THE BOTTOM OF THE DUCT OR FITTING TO THE UNDERSIDE OF THE DECK ABOVE.
- 3 WHEN VENT DUCTS ARE INDICATED BY A SINGLE LINE THE HORIZONTAL DIMENSIONS ARE TO THE CENTERLINE OF THE DUCT.
- 4 COMPANION FLANGES SHALL BE TEMPLATED TO VENDOR FLANGE TEMPLATES, WHEN PROVIDED, OR TO THE FLANGES ON WT CLOSURES, FANS, HEATERS, COOLING COILS, FLAME ARRESTORS AND MANUAL CUT-OFF DAMPERS WHERE REQUIRED.
- 5 MINOR ADJUSTMENTS IN VENTILATION LOCATIONS MAY BE ACCOMPLISHED ON THE SHIP TO CLEAR OBSTRUCTIONS WITHOUT DRAWING CHANGE UPON AUTHORIZATION BY DESIGN REPRESENTATIVE.
- 6 TAKE-OFFS ARE TO BE TAKEN FROM DUCTS AT 45 DEGREES TO THE DIRECTION OF AIR FLOW UNLESS OTHERWISE NOTED ON THE VENTILATION ARRANGEMENT PLANS, OR WHERE INTERFERENCES OCCUR AT THE INSTALLATION.

- 7 ALL DUCTWORK, WATERTIGHT AND NONWATERTIGHT, SHALL BE CONSTRUCTED OF ONE OF THE FOLLOWING MATERIALS: ALUMINUM, SPEC QQ-A-250/8 OR ASTM B-209, ALLOY 5052; GALVANIZED SHEET STEEL, FED SPEC QQ-S-775, TYPE I, CLASS D, HOT ROLLED STEEL, ASTM A569, GALVANIZED AFTER FABRICATION TO EQUAL QQ-S-775 WHEN DUCTWORK IS 1/8 INCH THICK OR LESS. THE MINIMUM THICKNESS OF MATERIAL FOR DUCTWORK SHALL BE AS INDICATED IN TABLE A:

TABLE A THICKNESS FOR SHEET/FABRICATED DUCTWORK

DIAMETER OR LONGER SIDE	NONWATERTIGHT		WATERTIGHT	
	GALV. STL	ALUM	GALV. STL	ALUM
6" AND LESS	.018	.025	.075	.106
6½" TO 12"	.030	.040	.100	.140
12½" TO 18"	.036	.050	.118	.160
18½" TO 30"	.048	.060	.118	.160
ABOVE 30"	.060	.080	.118	.160

- 8 SEAMLESS OR WELDED TUBING MAY BE USED FOR ROUND OR FLAT OVAL DUCTWORK. MACHINE BENDING OF TUBING IS ALLOWABLE. TUBING, WHEN USED, SHALL CONFORM TO THE MINIMUM THICKNESS AS SHOWN IN TABLE "B":

TABLE B THICKNESS FOR WELDED/SEAMLESS TUBING

TUBING SIZE	NONWATERTIGHT	WATERTIGHT
	ALUM	ALUM
3" TO 6"	.035	.106
6½" TO 12"	.050	.140

- 9 COMMERCIALY MANUFACTURED SPIRALLY WOUND GALVANIZED STEEL OR ALUMINUM DUCT AND FITTINGS MAY BE USED FOR ROUND AND FLAT OVAL NONWATERTIGHT DUCTWORK. TABLE "C" PROVIDES MINIMUM THICKNESS OF MATERIAL FOR SPIRALLY WOUND DUCT.


TABLE C THICKNESS FOR SPIRALLY WOUND DUCT

DIAMETER	NONWATERTIGHT	
	GALV STL	ALUM
8" AND LESS	.018	.025
ABOVE 8"	.030	.032

- 10 DUCTS THAT PASS THROUGH OR ARE EXTENTIONS OF COMPARTMENTS SUBJECT TO TIGHTNESS TESTS, AND DUCTS THAT SERVE AS SPRINKLING OVERFLOWS FOR AMMUNITION SPACES, SHALL BE INCREASED IN THICKNESS AS NECESSARY TO WITHSTAND THE PRESSURES TO WHICH THEY MAY BE EXPOSED. WHERE THIS OCCURS, THE REQUIRED MATERIAL THICKNESS SHALL BE NOTED ON THE VENTILATION PLAN.

- 11 NONWATERTIGHT LONGITUDINAL SEAMS FOR STEEL DUCT .048" THICK AND LESS, AND FOR ALUMINUM .050" THICK AND LESS, ARE TO BE LOCK JOINTED, LAPPED AND RIVETED, OR WELDED WHERE DESIRED FOR EASE OF FABRICATION. NONWATERTIGHT LONGITUDINAL SEAMS FOR .060" THICK STEEL AND FOR .060" AND .080" THICK ALUMINUM ARE TO BE WELDED OR MAY BE LAPPED AND RIVETED WHERE DESIRED FOR EASE OF FABRICATION. NONWATERTIGHT STEEL AND ALUMINUM DUCTS, OTHER THAN ROUND, SHALL HAVE FLANGED JOINTS. ROUND DUCT SHALL HAVE FLANGED JOINTS, AN APPROVED FLEXIBLE COUPLING, OR AN APPROVED BANDED TYPE SLEEVE CONNECTOR. RIVETED SEAMS SHALL HAVE A 3/4" LAP FOR ROUND DUCT AND 1" LAP FOR RECTANGULAR DUCTS WITH 3/16" RIVETS SPACED ON NOT MORE THAN 2" CENTERS. AT THE DISCRETION OF THE SHOP, STEEL DUCTS MAY BE SOLDERED IN LIEU OF RIVETED. BLIND RIVETS, MIL. SPEC. MIL-R-7885, TYPE II, OR MIL. SPEC. MIL-R-24243, MAY BE USED IN NONWATERTIGHT ALUMINUM DUCTWORK. SLIP JOINTS AND SHEET METAL SCREWS SHALL NOT BE USED IN DUCT CONSTRUCTION.
- 12 ALL WATERTIGHT SEAMS AND CONNECTING JOINTS SHALL BE WELDED, EXCEPT THAT WT FLANGED JOINTS MAY BE USED WHERE PORTABILITY IS DESIRED AND/OR TO FACILITATE INSTALLATION OR CLEANING.
- 13 DUCT DIMENSIONS GIVEN ON VENTILATION ARRANGEMENT PLANS FOR UNINSULATED OR INSULATED DUCTWORK ARE INSIDE DIMENSIONS. WHEN ONE DIMENSION IS GIVEN, IT IS UNDERSTOOD THAT THE DUCT IS CIRCULAR IN SECTION. WHEN TWO DIMENSIONS ARE GIVEN, IT IS UNDERSTOOD THAT THE DUCT IS RECTANGULAR IN SECTION. FLAT OVAL DUCTS ARE DESIGNATED BY THE LETTERS F.O. THE FIRST DIMENSION LISTED IS THE VISIBLE SIDE OF THE DUCT.
- 14 THE THICKNESS OF MATERIAL FOR ELBOWS, TEES, FITTINGS, AND TRANSITIONS SHALL BE EQUAL TO THAT REQUIRED FOR THE LARGEST DIMENSION OF THE DUCT.
- 15 ELBOWS FOR ROUND DUCT SHALL BE MADE IN ACCORDANCE WITH THE DETAIL SHOWN ON SHEET 19.
- 16 WHERE RADIUS OF BEND IS NOT GIVEN ON THE ARRANGEMENT PLAN, IT SHALL BE UNDERSTOOD THAT THE RADIUS IS EQUAL TO THE DUCT DIAMETER, IF ROUND, OR THE WIDTH OF THE DUCT IN THE PLANE OF THE BEND, IF RECTANGULAR OR FLAT OVAL. THE RADIUS IS TO BE TAKEN TO THE INSIDE OF THE BEND. RADII MAY BE REDUCED WHERE NECESSARY TO CLEAR INTERFERENCES.
- 17 DUCTS MARKED WITH AN ASTERISK (*) ON VENTILATION ARRANGEMENT PLANS INDICATE A CHANGE OF LEVEL. UNLESS CHANGE OF LEVEL OCCURS IN A CHANGE IN SHAPE, TWO TANGENT ELBOWS SHOULD BE USED FOR MINOR CHANGES.

- 18 THE ANGLE OF CONVERGING DUCT TRANSITIONS SHALL BE 15 DEGREES OR LESS, THE ANGLE DIVERGING DUCT TRANSITIONS SHALL BE 5 DEGREES OR LESS, UNLESS OTHERWISE INDICATED ON THE VENTILATION ARRANGEMENT PLAN.
- 19 THE BOTTOM OF THE CONNECTING TRANSFORMATION ON THE DISCHARGE SIDE OF DUCT COOLING COILS SHALL BE INCLINED UP AT LEAST 15 DEGREES FOR A DISTANCE EQUAL TO OR GREATER THAN THE VERTICAL DIMENSION OF THE COIL FACE TO PROVIDE DRAINAGE FOR WATER CARRY-OVER FROM THE COIL.
- 20 ALL DUCTS, ELBOWS, ETC., SHALL BE SMOOTH INSIDE AND FREE FROM PROJECTING LIPS OR OTHER OBSTRUCTIONS, EXCEPT NECESSARY OBSTRUCTIONS SUCH AS STIFFENING PLATES, DAMPERS, CLOSURES, SPLITTERS, VANES, AND ORIFICE PLATES.
- 21 ACCESS OPENINGS FOR CLEANING SHALL BE LOCATED IN THE BOTTOM OF THE DUCT UNLESS THE SIDE IS MORE ACCESSIBLE WITHOUT DISMANTLING OTHER INSTALLATIONS. THE WIDTH OF THE ACCESS COVER PLATE SHALL BE EQUAL TO WIDTH OF THE DUCT LESS 2 INCHES FOR FLANGES, AND THE LENGTH OF THE ACCESS COVER PLATE SHALL BE 24 INCHES IF THE SECTION OF DUCT WILL PERMIT. A STANDARD MANHOLE (23 x 15 INCHES FLAT OVAL) MAY BE PROVIDED IN VENT TRUNKS OF SIZE AND CONSTRUCTION THAT WOULD ALLOW A MAN TO BODILY WORK FROM WITHIN THE TRUNK FOR THE PURPOSE OF CLEANING. THE ACCESS COVER PLATES IN ALL CASES SHALL BE OF THE SAME MATERIAL AND THICKNESS AS THE DUCT OR TRUNK TO WHICH THEY ARE ATTACHED. GASKETS SHALL BE FITTED BETWEEN THE ACCESS COVER PLATE AND THE DUCT OR TRUNK.
- 22 THERE SHALL BE NO ACCESS COVER PLATES IN DUCT BETWEEN FLAME ARRESTERS AND COMPARTMENTS SERVED. CLEANING SHALL BE ACCOMPLISHED BY PROVIDING PORTABLE SECTIONS OF DUCT.
- 23 DRIPPROOF DUCTWORK SHALL BE WELDED OR SOLDERED AND AS A MINIMUM SHALL EXTEND FOR A DISTANCE OF NOT LESS THAN ONE FOOT ON EACH SIDE OF THE EQUIPMENT. STRAIGHT DUCT SECTIONS WITH SEAM AT TOP ONLY DO NOT REQUIRE SEALING. THE DUCT SHALL BE CONTINUOUS (WITHOUT FLANGES) FOR THE LENGTH INDICATED OVER THE EQUIPMENT. IN SPACES WHERE THE ARRANGEMENT OF ELECTRICAL EQUIPMENT IS EXTENSIVE, DUCTS SERVING OR PASSING THROUGH THE COMPARTMENT SHALL BE EITHER DRIPPROOF OR OF WT CONSTRUCTION.
- 24 EXHAUST DUCTS FROM SCULLERIES WITH DISHWASHERS SHALL BE MADE DRIPPROOF BY WELDING OR SOLDERING FOR A DISTANCE SUFFICIENT TO PREVENT MOISTURE SEEPAGE FROM THE DUCTS. WHERE DISHWASHERS ARE CONNECTED, DUCTS SHALL BE DESIGNED SO THAT OPTIMUM DRAINAGE OF MOISTURE IS OBTAINED, THEY SHALL BE MADE DRIPPROOF FROM THE SPACE TO THE WEATHER.

- 25 VENTILATION SCREENS SHALL BE ACCESSIBLE AND EASILY REMOVABLE. EXHAUST TERMINAL SCREENS SHALL BE SECURED TO THE TERMINAL BY A 1/16", 7 X 7 WIRE ROPE APPROXIMATELY 8" LONG.
- 26 A MANUALLY OPERATED DAMPER, FOR TEMPERATURE CONTROL, SHALL BE INSTALLED IN THE BRANCH SERVING EACH COMPARTMENT ON A ZONE HEATING OR COOLING SYSTEM EXCEPT THE BRANCH SERVING THE SPACE IN WHICH THE THERMOSTAT IS INSTALLED.
- 27 DAMPER HANDLES ARE TO BE LOCATED ON THE BOTTOM, EXCEPT WHEN NOTED ON THE ARRANGEMENT PLAN.
- 28 COAMINGS AND SPOOLS FOR DUCT PENETRATIONS SHALL BE OF THE THICKNESS, MATERIAL AND LOCATION AS SPECIFIED ON THE VENTILATION ARRANGEMENT PLAN.
- 29 FLAT OVAL OR CIRCULAR DUCTS, OR RECTANGULAR DUCTS WITH CORNER RADII OF NOT LESS THAN ONE QUARTER OF THE SMALLER DIMENSION, SHALL BE USED FOR PENETRATION OF DECKS, BEAMS, GIRDERS OR STRENGTH MEMBERS.
- 30 WHERE CORNER RADII ARE REQUIRED ON RECTANGULAR DUCT, THE CONNECTING DUCT NEED NOT BE FAIRER IN IF THE REDUCTION IN AREA IS 5% OR LESS.
- 31 DRAINS SHALL BE PROVIDED AT LOW POINTS IN ALL DUCTS AND TRUNKS AS MAY BE NECESSARY TO REMOVE ACCUMULATIONS OF WATER.
- 32 WATERPROOF VENTILATORS SHALL CONFORM TO STD. DRAWINGS S3801-860362 THRU 860385 FOR THE SIZE AS SPECIFIED.
- 33 VANEAXIAL FANS INSTALLED IN THE HORIZONTAL POSITION SHALL NOT HAVE THE ELECTRICAL CONNECTION LOCATED ON THE BOTTOM.
- 34 TWO SPEED FANS FOR RECIRCULATING SYSTEMS, HOODS, AND SPACES WITH SPECIAL REQUIREMENTS AS NOTED ON THE VENTILATION ARRANGEMENT PLAN SHALL BE INSTALLED TO OPERATE ON FULL SPEED ONLY.
- 35 ALL ELECTRIC DUCT HEATER CONTROLLERS SHALL BE INTERLOCKED WITH THE ASSOCIATED VENTILATION FAN CONTROLLER TO PREVENT OPERATION OF THE HEATER UNLESS THE FAN IS RUNNING.
- 36 AIR VOLUMES ARE GIVEN IN CUBIC FEET PER MINUTE (CFM). AIR VELOCITIES ARE GIVEN IN FEET PER MINUTE (FPM).
- 37 ALL EQUIPMENT WHICH ARE PERMANENTLY MOUNTED IN SHOCK CRITICAL AREAS AND FOR WHICH NO  SYMBOL HAS BEEN SHOWN SHALL BE MOUNTED IN ACCORDANCE WITH THE DETAILS OF REFERENCE 14.

- 38 FOR THREADED CONNECTIONS, THROUGH BOLTING SHALL BE USED WHEREVER POSSIBLE. WHERE USE OF SUCH BOLTING IS NOT POSSIBLE, STUDS, TAPBOLTS OR MACHINE SCREWS MAY BE USED.
- 39 ALL MACHINE SCREWS, BOLTS, NUTS AND WASHERS TO BE OF STEEL, EITHER CADMIUM OR ZINC COATED, WITH THE FOLLOWING EXCEPTIONS:
OUTSIDE WORK: FOR CRES OR NON-FERROUS FITTINGS TO ALUMINUM STRUCTURE, USE CRES SCREWS, BOLTS OR RIVETS.
INSIDE WORK: WHERE EXPOSED TO MOISTURE OR BAD CONDITIONS AS REGARDS TO HUMIDITY, SUCH AS IN LAUNDRY, GALLEY OR IN CLOSE PROXIMITY TO AIRPORTS, ALUMINUM ALLOY FITTINGS TO BE SECURED WITH CRES SCREWS OR BOLTS.
FOR COMPOSITION FITTINGS TO ALUMINUM STRUCTURE USE GALVANIZED STEEL BOLTS (NOT TAPES OR SCREWS) DIPPED IN ZINC CHROMATE PRIMER, FORMULA 84.
- 40 WASHERS OF THE SAME MATERIAL AND COATING AS BOLTS AND NUTS SHALL BE FITTED BELOW ALL NUTS AND BOLT HEADS WHICH ADJOIN ALUMINUM.
- 41 FLEXIBLE JOINTS SHALL BE USED AT FAN-DUCT CONNECTIONS IF THE FANS ARE FITTED WITH VIBRATION DAMPING MOUNTINGS. FLEXIBLE JOINTS SHALL BE FLANGED RUBBER SPOOLS OF 45 DUROMETER HARDNESS, MIL. SPEC. MIL-R-6855, CLASS 2. THE SPOOL MATERIAL SHALL BE AT LEAST 3/16" THK AND AT LEAST TWO INCHES LONG IN THE DIRECTION OF AIR FLOW.
FOR NONWATERTIGHT DUCTWORK THE FLEXIBLE JOINT SHOWN ON SHEET 39 MAY BE USED.
- 42 GASKET MATERIAL FOR JOINTS NOT EXPOSED TO HIGH TEMPERATURE SHALL BE RUBBER FED SPEC HH-P-151 AS INDICATED ON THE ARRANGEMENT PLAN. GASKET MATERIAL FOR JOINTS EXPOSED TO HIGH TEMPERATURES, SUCH AS HEATERS, SHALL BE RUBBER MIL SPEC MIL-G-22050.
CARE SHOULD BE TAKEN WHEN INSTALLING GASKETS THAT THEY DO NOT EXTEND INTO THE AIR STREAM.
- 43 WHERE CLEARANCE CUTS FOR DUCT PENETRATIONS THRU JOINER NONTIGHT BULKHEADS EXCEEDS 1/2" PER SIDE AND WHERE RATPROOF OR FUME TIGHT INTEGRITY MUST BE MAINTAINED, COLLAR PLATES, AS SHOWN ON REFERENCE 3, SHALL BE INSTALLED.
- 44 A CLEAR HEADROOM UNDER THE FLANGE OF DUCTS AND BRANCHES OF AT LEAST 6'- 5" IS REQUIRED IN ALL WALKING AREAS. WHERE UNAVOIDABLE AND WHERE A FLAT FLANGE, SHOWN ON SHEET 30, CANNOT BE USED, FLANGES AND FLANGE CORNERS PROTRUDING BELOW THE MINIMUM HEADROOM LEVEL SHALL BE PADDED TO PREVENT INJURY TO PERSONNEL. FLAT FLANGES ARE TO BE KEPT TO A MINIMUM.

- 45 THE ORIFICE PLATES, FOR BALANCING, PROVIDED IN MAINS AND BRANCHES OF SYSTEMS SERVING VENTILATED AND AIR CONDITIONED SPACES HAVE BEEN CALCULATED DURING THE DESIGN PHASE, DURING THE TESTING PHASE, FOR PROPER VOLUME DELIVERY, THESE ORIFICE PLATES MAY BE MODIFIED AS REQUIRED.
- 46 ORIFICE PLATES SHALL BE MADE OF .063"THK ALUMINUM OR .051" THK GALVANIZED STEEL WITH INSIDE DIMENSIONS AS SPECIFIED ON THE ARRANGEMENT PLAN. FABRICATE WITH A 1" RADIUS SEMI-CIRCULAR PROTRUSION AT THE EXTERNAL EDGE TO FACILITATE TESTING.
- 47 TO INSURE THE PROPER OPERATION OF FILTER GAGES AND TO PREVENT THE ACCUMULATION OF DIRT AND DEBRIS ON FLAME ARRESTERS AND FILTER MEDIA DURING THE CONSTRUCTION PERIOD, FLAME ARRESTERS, FILTER GAGES AND FILTER MEDIA SHALL BE INSTALLED ONLY AFTER THE SPACES SERVED HAVE BEEN THOROUGHLY CLEANED PRIOR TO TESTING. ALL OPENINGS IN A SYSTEM SHALL BE BLANKED OFF PROGRESSIVELY AS THE SYSTEM IS INSTALLED.
- 48 SPECIAL CARE SHALL BE TAKEN WHEN INSTALLING TERMINALS TO PREVENT WATER FROM DRIPPING, SPLASHING OR BEING BLOWN INTO OR ON ELECTRICAL EQUIPMENT. TAMPERPROOF STOPS MAY BE PROVIDED ON ADJUSTABLE BLAST TERMINALS WHERE NECESSARY TO PREVENT AIR FROM BEING DISCHARGED ACROSS THE EQUIPMENT.
- 49 HANGERS SHALL BE FITTED FOR PROPER SUPPORT OF ALL HEATERS, DUCTWORK AND TERMINALS. HANGER SPACING FOR DUCTWORK IS NOT TO EXCEED EIGHT FEET, HANGERS SHOULD BE ALUMINUM IN WAY OF ALUMINUM STRUCTURE AND STEEL IN WAY OF STEEL STRUCTURE.
- 50 DUCTS CLASSIFIED AS GRADE "A" SHOCK PASSING THROUGH CLEARANCE CUTS IN NONTIGHT AND JOINER BULKHEADS, MUST BE SUPPORTED BY A HANGER PLACED NOT MORE THAN SIX INCHES FROM THE BULKHEAD.
- 51 DAMPERS, TERMINALS AND OTHER COMPONENTS NOT SUPPORTED BY A FOUNDATION SHALL BE SUPPORTED WITH AT LEAST ONE HANGER AND IT SHALL BE LOCATED WITHIN TWELVE INCHES OF THE COMPONENT.
- 52 HANGERS SHOULD BE ATTACHED AS NEAR AS POSSIBLE TO DIVISION JOINTS.
- 53 WHERE GRADE "A" SHOCK DUCTS ARE LOCATED WITHIN TWO INCHES OF EQUIPMENT AND/OR STRUCTURE AND WHEN IMPACTING WITH THE EQUIPMENT OR STRUCTURE WOULD RESULT IN "POINT CONTACT", AN ADDITIONAL HANGER TO PREVENT IMPACT SHALL BE INSTALLED.
- 54 HANGER LOCATIONS FOR VERTICAL DUCTS ARE TO BE AT THE DUCT MIDPOINT BETWEEN DECKS.

- 55 ALL HANGERS SHOULD BE ATTACHED TO STRUCTURAL FRAMING AND STIFFENERS IN LIEU OF PLATING WHENEVER POSSIBLE. DUCTS AND HEATERS DESIGNED TO MEET THE REQUIREMENTS OF GRADE "A" SHOCK SHALL BE ATTACHED, IN ACCORDANCE WITH REFERENCE 24, TO FRAMING IN LIEU OF PLATING OF WEATHER BOUNDARIES SUBJECTED TO THE FORCE OF LOADS SUCH AS GUN AND/OR MISSILE BLAST.
- 56 AIR FLOW DIRECTION ARROW ON THE BOTTOM OF EACH COOLING COIL DRAIN PAN SHALL BE ALIGNED WITH THE DIRECTION OF AIR FLOW. THE PAN MAY BE ROTATED 180 DEGREES TO ACCOMPLISH THIS REQUIREMENT.
- 57 ON 50 SERIES COOLING COILS THE DRAIN PAN MUST ALWAYS BE INSTALLED SO THAT THE SLOTTED OPENING ALLOWING CONDENSATE PASSAGE INTO THE PAN IS ON THE AIR LEAVING SIDE.
- 58 FAYING SURFACES OF ALUMINUM IN CONTACT WITH ALUMINUM AND EXPOSED TO THE WEATHER SHALL BE COATED WITH ONE COAT OF ZINC CHROMATE PRIMER 84, EXCEPT IN WAY OF WELDING.
- 59 WHERE ALUMINUM WILL BE JOINED TO OTHER METALS INCLUDING GALVANIZED STEEL, EACH METAL FAYING SURFACE SHALL BE PROTECTED WITH TWO COATS OF FORMULA 84 OVER ONE COAT OF FORMULA 117. IN ADDITION, WHERE SUCH JOINTS ARE EXPOSED TO THE WEATHER, SEA WATER OR WET SPACES, INSULATION TAPE, MINIMUM THICKNESS 20 MILS, MIL. SPEC. MIL-I-24391, SHALL BE INSTALLED BETWEEN THE FAYING SURFACES AND SHALL EXTEND BEYOND THE EDGE OF THE JOINT.
- 60 NONWELDED FAYING SURFACES OF STEEL DUCT JOINTS SHALL RECEIVE TWO COATS OF PRIMER, FORMULA 116, ON EACH SURFACE, IN ADDITION TO GASKETS.
- 61 INTERNAL SURFACES OF UNGALVANIZED STEEL EXHAUST TRUNKS FOR A DISTANCE OF TEN FEET FROM THE WEATHER DISCHARGE AND ALL INTERNAL UNGALVANIZED STEEL SURFACES OF SUPPLY TRUNKS SHALL BE COATED WITH THERMAL SPRAYED ALUMINUM IN ACCORDANCE WITH REF 1, SECT. 630 OR PAINTED WITH TWO COATS OF EPOXY-POLYAMIDE PRIMER, FORMULA 150. UNLESS OTHERWISE SPECIFIED ON THE VENTILATION ARRANGEMENT PLAN, PAINTING OF INTERNAL SURFACES OF ALUMINUM OR GALVANIZED STEEL DUCTS AND TRUNKS IS NOT REQUIRED. INTERNAL SURFACES OF ALL DUCTS HANDLING CORROSIVE FUMES SHALL BE COVERED WITH ONE OF THE FOLLOWING:
- 1 SYNTHETIC RUBBER, MIL-R-15058
 - 2 FOUR COATS OF EPOXY POLAMIDE PAINT, MIL. SPEC. MIL-P-24441
 - 3 PLASTIC PLASTISOL, MIL. SPEC. MIL-P-20689, TYPE I (DIPCOATED)
- 62 EXTERNAL SURFACES OF ALUMINUM AND STEEL DUCTS SHALL BE PREPARED FOR PAINTING IN ACCORDANCE WITH PREPARATION GIVEN TO ADJACENT STRUCTURE, AFTER INSTALLATION ON THE SHIP, AND SHALL BE PAINTED THE SAME AS ADJACENT STRUCTURE. WHEN EXCEPTIONS TO THE PRECEDING REQUIREMENT OCCUR SPECIAL REQUIREMENTS SHALL BE NOTED ON THE VENTILATION ARRANGEMENT PLAN.

- 63 TYPE "E" TERMINALS IN MACHINERY SPACES ARE TO BE DIRECTED AT AND LOCATED WITHIN 3 TO 5 FEET OF THE WATCH-STANDERS OR OPERATORS TORSO.
- 64 FLEXIBLE CONNECTIONS, REQUIRED AT THE ENDS OF RESILIENTLY MOUNTED FANS, SHALL BE SLIGHTLY COMPRESSED WHEN INSTALLED TO ALLOW FOR ISOLATOR MOVEMENT. FLEXIBLE CONNECTIONS SHALL NOT BE PAINTED.
- 65 TEMPORARY PROTECTIVE COVERING SHALL BE PROVIDED AT OPEN FACES OF COOLING COILS, HEATERS AND ELECTROSTATIC PRECIPITATORS DURING INSTALLATION AS NECESSARY.
- 66 WHERE TEMPORARY OPENINGS IN DUCTWORK ARE NECESSARY TO FACILITATE INSTALLATION, CARE SHALL BE EXERCISED THAT THE SYSTEM TIGHTNESS INTEGRITY IS RESTORED UPON COMPLETION.
- 67 ALL EXISTING DUCTWORK, COILS, FANS AND COMPONENTS RETAINED FOR REUSE SHALL BE CLEANED AND RESTORED TO THEIR ORIGINAL PERFORMANCE PROFILE.
- 68 ALL WELDING SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION 074 OF REFERENCE 1 AND NAVAL SHIPS TECHNICAL MANUAL, NAVSEA S9086-CH-STM-010 CHAPTER 074.
- 69 PORTABLE TEST COVERS SHALL BE .106" THK ALUMINUM WITH OUT-SIDE EDGE PROTUDING 1/8" BEYOND COMPANION DUCT FLANGES AND DRILLED TO SUIT SAME. INSTALL ADJACENT TO PLACE OF APPLICATION.
- 70 THE LEADING EDGES OF ALL DAMPERS, SPLITTERS AND DEFLECTORS SHALL BE ROUNDED OR FOLDED BACK.

POLYCHLORINATED BIPHENYLS (PCBs) NOTES

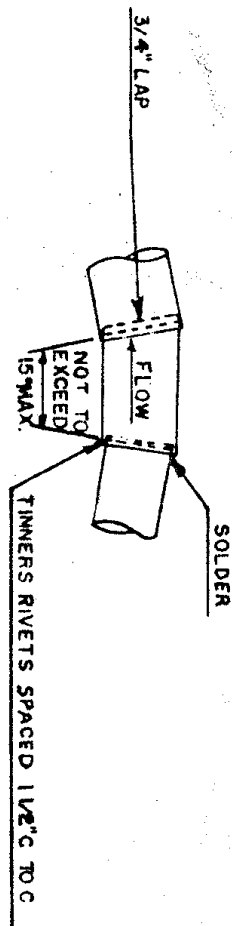
- 1 PRIOR TO REMOVAL OF EXISTING VENTILATION DUCTWORK, FLANGE JOINTS SHALL BE INSPECTED FOR THE PRESENCE OF FELT GASKETS. FELT GASKETS SHALL BE ASSUMED TO BE CONTAMINATED WITH POLYCHLORINATED BIPHENYLS (PCBs) UNLESS CONFIRMED BY TESTING TO BE PCB FREE. PCB CONTAMINATED GASKETS SHALL BE REMOVED AND DISPOSED OF PER TITLE 40 OF FEDERAL REGULATIONS SECTION 761 AND AS DIRECTED BY THE LOCAL NAVAL SUPERVISING AUTHORITY. ACTIVITIES SHALL IMPLEMENT PROCEDURES TO PREVENT PCB CONTAMINATION OF OTHER AREAS OF THE SHIP AS A RESULT OF FELT GASKET REMOVAL.
- 2 WOOL FELT GASKET MATERIAL SHALL NOT BE INSTALLED IN NEW VENTILATION DUCTING OR EXISTING VENTILATION DUCTING DISTURBED BY THIS DRAWING.
- 3 TAGGING OF FLANGES AND CLEANING OF FLANGES SHALL BE AS DIRECTED BY LOCAL NAVAL SUPERVISING AUTHORITY.

THERMAL AND ACOUSTIC DUCT INSULATION NOTES

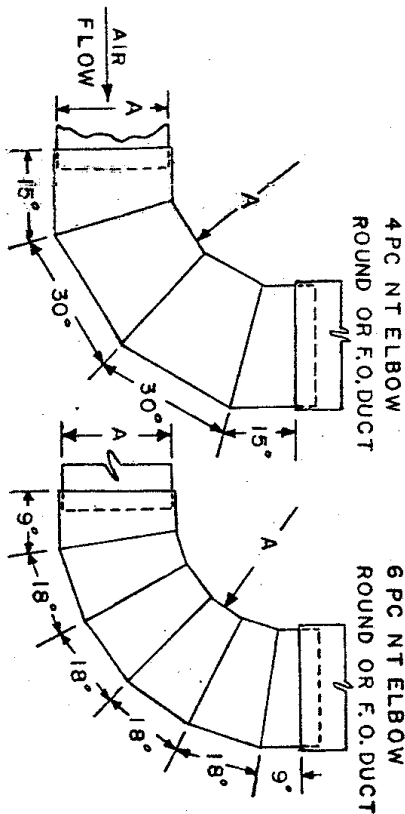
- 1 THERMAL INSULATION SHALL BE APPLIED, IN ACCORDANCE WITH THE REQUIREMENTS OF REFERENCES 28 & 63 TO VENTILATION AND AIR CONDITIONING SYSTEMS TO REDUCE HEAT LOSSES OR GAINS AND TO PREVENT CONDENSATION. THE FOLLOWING SPECIFIC REQUIREMENTS APPLY:
 - A ON PARTS OF TRUNKS AND DUCTS (INCLUDING THEIR FLANGES) OF VENTILATION SUPPLY SYSTEMS CARRYING UNHEATED AIR THAT PASS THROUGH NORMALLY HEATED SPACES, AND ON PARTS OF TRUNKS OR DUCTS OF ALL SUPPLY SYSTEMS THAT PASS THROUGH OR TERMINATE IN HEAT-PRODUCING SPACES
 - B ON PARTS OF EXHAUST TRUNKS OR DUCTS FROM HEAT-PRODUCING SPACES THAT PASS THROUGH SPACES OTHER THAN UPTAKE PLENUMS.
 - C ON PARTS OF AIR CONDITIONING SYSTEMS WHERE THE SPACE DEW POINT IS MORE THAN FOUR DEGREES F. HIGHER THAN THE DUCT AIR DRY BULB TEMPERATURE.
 - D ON ALL AIR CONDITIONING DUCTWORK FROM THE COOLING COIL TO THE FAN. IF THE FAN IS LOCATED UPSTREAM OF THE COOLING COIL, INSULATION SHALL BE APPLIED FROM THE DISCHARGE OF THE COOLING COIL TO A POINT DOWNSTREAM OF THE BY-PASS BRANCH EQUAL TO FIVE TIMES THE EQUIVALENT DIAMETER OF THE MAIN.
 - E ON DISTRIBUTION DUCTS IN WAY OF BERTHS, IF THE TEMPERATURE IN THE DUCT IS HIGHER THAN 90 DEGREES F.
 - F ON ALL TRUNKS AND DUCTS THAT PASS THROUGH REFRIGERATED SPACES.
 - G ON THE HOT SIDE OF REHEATERS, THAT PASS THROUGH BUT NOT SERVING COMPARTMENTS, IF THE TEMPERATURE DIFFERENCE BETWEEN COMPARTMENT AND DUCTS IS GREATER THAN 25 DEGREES F.
 - H ON ALL VENTILATION HEATERS WHEREVER PROTECTION OF PERSONNEL IS INVOLVED.
 - I AN ANTI-SWEAT COATING OF AT LEAST 1/16 INCH THICKNESS SHALL BE APPLIED TO THE DUCTWORK IN PASSAGES WITH DIRECT OPENING TO THE WEATHER OR THAT ARE ADJACENT TO AND OPEN TO GALLEYS, SCULLERIES AND IN THE OVERHEAD OF SPACES THAT HAVE SUSPENDED SHEATHING.
- 2 FLANGES IN WAY OF INSULATED DUCTS ARE TO BE INSULATED IN ACCORDANCE WITH THE DETAILS OF REFERENCES 28 & 63 WHERE BANDED DUCT CONNECTORS ARE USED IN LIEU OF FLANGES, THE DUCT INSULATION AND LAGGING SHALL TERMINATE ONE INCH FROM EACH SIDE OF THE CONNECTOR. A STRIP OF FIBER GLASS BLANKET COVERED WITH FIBER GLASS CLOTH SHALL THEN BE FITTED AROUND THE CONNECTOR, BETWEEN TERMINATIONS OF THE DUCT INSULATION, AND HELD IN PLACE BY TWO SHEET METAL STRAPS, ONE INCH WIDE. A VAPOR BARRIER, IF REQUIRED, AND PAINT SHALL BE APPLIED.

- 3 THE PROCEDURE FOR APPLICATION OF UNSURFACED FIBER GLASS BOARD INSULATION SHALL BE AS FOLLOWS:
- A THE DUCT SHALL BE LIBERALLY BRUSH COATED WITH ADHESIVE CEMENT, MIL-A-3316, TYPE I. THE INSULATION BOARD, WHICH SHALL HAVE BEEN PREVIOUSLY CUT AND FITTED TO THE DUCT, SHALL BE EMBEDDED INTO THE CEMENT. IN TIGHT PLACES WHERE THE CEMENT CANNOT BE APPLIED DIRECTLY TO THE DUCT, IT MAY BE TROWELED ONTO THE INSULATION BOARD.
 - B THE INSULATED DUCT SHALL THEN BE LAGGED SIMILAR TO NOTE 5-B & C.
- 4 THE PROCEDURE FOR APPLICATION OF HARD SURFACED FIBER GLASS BOARD INSULATION SHALL BE AS FOLLOWS:
- A THE DUCT SHALL BE LIBERALLY COATED WITH ADHESIVE CEMENT, MIL-A-3316, TYPE I. THE HARD SURFACED BOARD WHICH SHALL HAVE BEEN PREVIOUSLY CUT AND FITTED TO THE DUCT SHALL BE EMBEDDED INTO THE CEMENT WITH HARD SURFACE SIDE OUTWARD, IN TIGHT PLACES, IF THE CEMENT CANNOT BE APPLIED DIRECTLY TO THE DUCT, IT MAY BE TROWELED ONTO THE INSULATION BOARD.
 - B THE SEAMS BETWEEN SECTIONS OF INSULATED BOARD SHALL BE COVERED WITH 2 INCH WIDE FIBER GLASS TAPE, 4 INCH WIDE ON CORNERS, MIL-C-20079, TYPE II, AND APPLIED TO THE HARD SURFACE OF THE BOARD USING AN ADHESIVE CEMENT, MIL-A-3316, TYPE II. NO FURTHER LAGGING IS REQUIRED.
 - C THE ENTIRE APPLICATION SHALL BE ALLOWED TO DRY THOROUGHLY AND COATED COMPLETELY WITH VAPOR BARRIER.
- 5 THE PROCEDURE FOR APPLICATION OF BLANKET TYPE INSULATION SHALL BE AS FOLLOWS:
- A THE DUCT SHALL BE LIBERALLY BRUSH COATED WITH ADHESIVE CEMENT, MIL-A-3316, TYPE III. THE INSULATION BLANKET SHALL THEN BE WRAPPED AROUND THE ADHESIVE COATED DUCT, IN TIGHT PLACES WHERE THE CEMENT CANNOT BE APPLIED DIRECTLY TO THE DUCT, IT SHALL BE TROWELED ONTO THE INSULATION.
 - B THE INSULATED DUCT SHALL THEN BE LAGGED. THE LAGGING SHOULD BE CEMENTED BY GIVING THE INSULATED DUCT A LIBERAL APPLICATION OF ADHESIVE COATING MIL-A-3316, TYPE I, AND EMBEDDING THE CLOTH THEREIN. A FINAL BRUSH COAT OF THE ADHESIVE COATING SHALL THEN BE APPLIED OVER THE LAGGING.
 - C THE INSULATED DUCT SHALL BE ALLOWED TO DRY THOROUGHLY AND COATED COMPLETELY WITH VAPOR BARRIER.
- 6 WHERE NECESSARY INSULATION ON DUCTS MAY BE TRIMMED TO NOT LESS THAN 1/4 INCH IN WAY OF INTERFERENCES TO FACILITATE INSTALLATION.
- 7 LAGGING FOR THAT PORTION OF DUCTWORK EXPOSED TO THE WEATHER SHALL BE COATED WITH WEATHERPROOFING CEMENT SIMILAR TO JOHNS-MANVILLE "INSULKOTE" OR EQUAL.

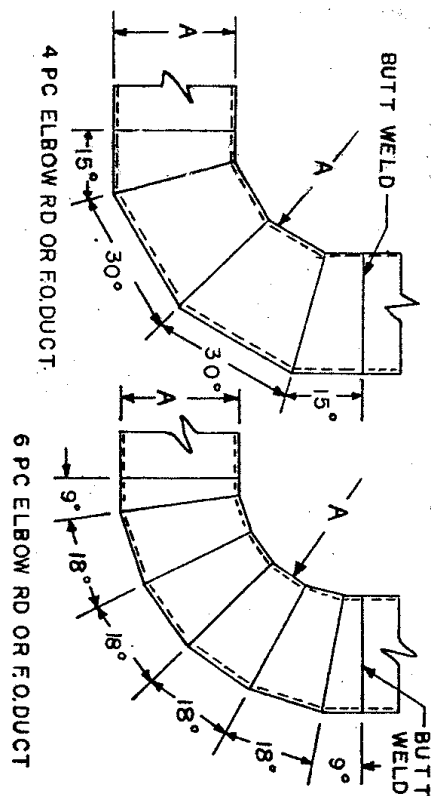
- 8 THE FOLLOWING MATERIALS SHALL BE USED FOR THERMAL INSULATION AS REQUIRED BY VENTILATION ARRANGEMENT PLANS:
- A FOR ROUND DUCTS, ONE INCH FIBER GLASS BLANKET, MIL-I-22023, TYPE I, (LAGGED) OR ONE INCH FIBER GLASS COVERING, MIL-I-22344.
 - B FOR RECTANGULAR AND FLAT OVAL DUCTS, ONE INCH FIBER GLASS BLANKET, MIL-I-22023, (LAGGED) OR ONE INCH FIBER GLASS HARD SURFACE BOARD MIL-I-742, TYPE I, (NOT LAGGED) OR ONE INCH FIBER GLASS UNFACED BOARD MIL-I-742, TYPE II, (LAGGED) EXCEPT THAT TYPE I SHALL BE USED ON DUCTS WITH A FLAT BOTTOM SURFACE NINE INCHES OR MORE IN WIDTH.
 - C FOR FLANGES, FIBER GLASS BLANKET, MIL-I-22023, TYPE I, SHALL BE USED.
 - D FOR TRUNKS AND VENTILATION HEATERS, ONE INCH FIBER GLASS BOARD, MIL-I-742, TYPE I.
 - E FOR INSULATED COVERS, ONE INCH FIBER GLASS BLANKET, MIL-I-22023, CLASS 5, PLACED BETWEEN SHEETS OF FIBER GLASS CLOTH MIL-C-20079, TYPE I, CLASS AS APPLICABLE.
 - F SHEATHING FOR THERMAL INSULATION SHALL BE CORROSION RESISTING STEEL NO. 22 USGA FED. SPEC. QQ-S-766, CLASS 430, 2B FINISH.
 - G LAGGING SHALL BE FIBER GLASS CLOTH, TAPE AND THREAD, MIL-C-20079
 - H ADHESIVE SHALL BE IN ACCORDANCE WITH MIL-A-3316
 - I VAPOR BARRIER SHALL BE THREE ALTERNATE COATS, WHITE, ORANGE AND WHITE, IN THAT ORDER, OF COATING COMPOUND MIL-C-19993.
- 9 ACOUSTIC INSULATION SHALL BE INSTALLED AS DESIGNATED ON THE VENTILATION ARRANGEMENT PLAN TO MEET THE SPACE NOISE CRITERIA OF SECTION 073 OF REFERENCE 1.
- 10 ACOUSTIC INSULATION SHALL BE ACOUSTIC ABSORPTIVE MATERIAL MIL. SPEC. MIL-I-22023, TYPE II.
- 11 THE INTERNAL SURFACE OF THE ACOUSTIC INSULATION SHALL BE COVERED WITH PERFORATED ALUMINUM SHEATHING .04 INCHES THICK, QQ-A-250/8. THE PERFORATIONS SHALL BE 3/16 INCHES IN DIAMETER, STAGGERED ON 3/8 INCH CENTERS.
- 12 ACOUSTIC INSULATION SHALL BE INSTALLED INTERNALLY IN THE DUCT IN ACCORDANCE WITH REFERENCES 38 & 63 AND SHEETS 49 AND 50.
- 13 WHERE REQUIREMENTS ARE SUCH THAT SOUND INSULATION IS TO BE APPLIED TO DUCTS THAT WOULD NORMALLY HAVE BEEN TREATED WITH THERMAL INSULATION THE ACCESS COVER PLATES IN THE DUCTS SHALL BE SOUND TREATED INTERNALLY (SEE REF. 36). WHERE ONLY SOUND INSULATION IS REQUIRED THE ACCESS COVER PLATE SHALL NOT BE INSULATED.



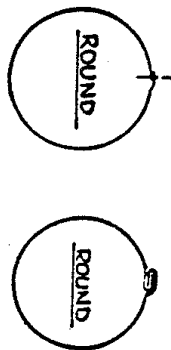
1. TRANSVERSE SEAMS OF STEEL DUCTS BELOW #14 USSG (0766) THK
2. OR ALUMINUM DUCTS BELOW #16 B & SG (0508) THK.
3. FOR HEAVIER METAL, JOINTS TO BE WELDED



NT ELBOWS - LAPPED & RIVETED
FOR AL DUCT UP TO & INCLUDING .050" THK
FOR STL DUCT UP TO & INCLUDING #18 GA

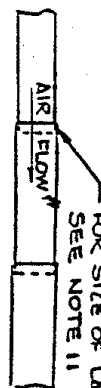


WT ELBOW - WELDED
FOR AL DUCTS .060 THK & OVER
FOR STL DUCTS #16 GA & OVER

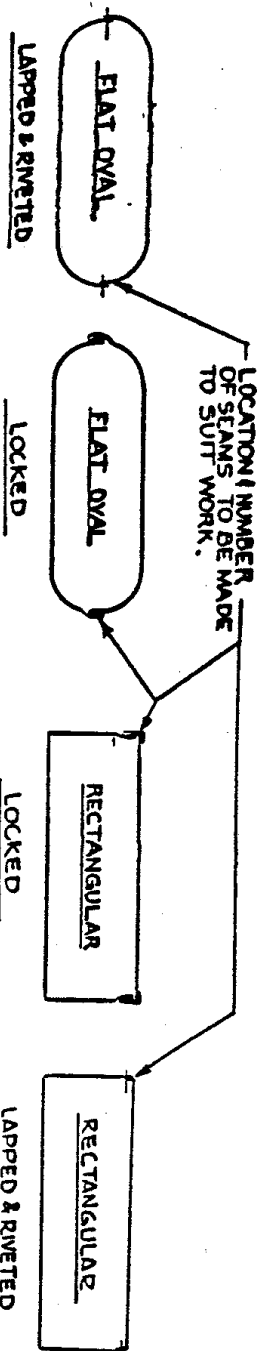


LAPPED & RIVETED

LOCKED

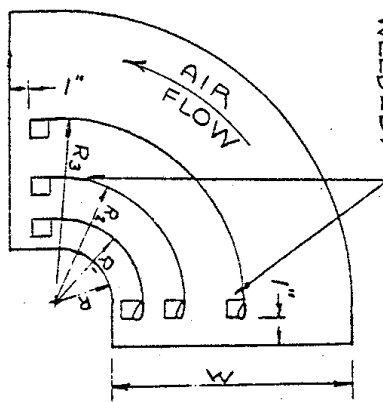


TYPICAL CIRCUMFERENTIAL SEAMS
WITH RESPECT TO AIR FLOW



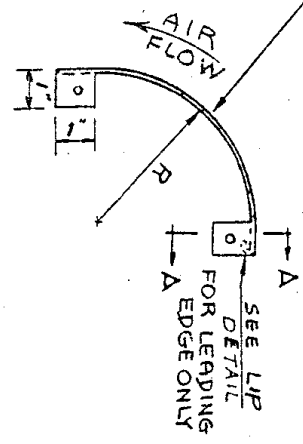
LONGITUDINAL SEAMS FOR NWT DUCTS
SEE NOTE 11

NOTE:
 .050" THK. & OVER WELD
 DIRECTLY TO ELBOW
 WITH CHAIN WELD 1/2"-1".
 LESS THAN .050" THK. TO
 BE RIVETED AS SHOWN
 OR SPOT WELDED.



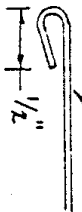
FOR THE NO. OF SPLITTERS &
 RADII, SEE ARRGT. DWGS.

THICKNESS TO BE THAT OF
 A N.W.T. ELBOW OF THE
 SAME SIZE.



SPLITTER DETAIL

DO NOT SQUEEZE FLAT

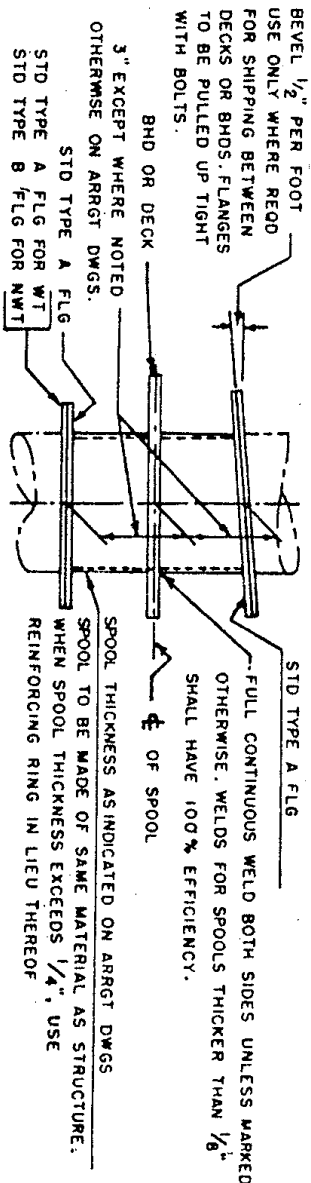


LIP DETAIL

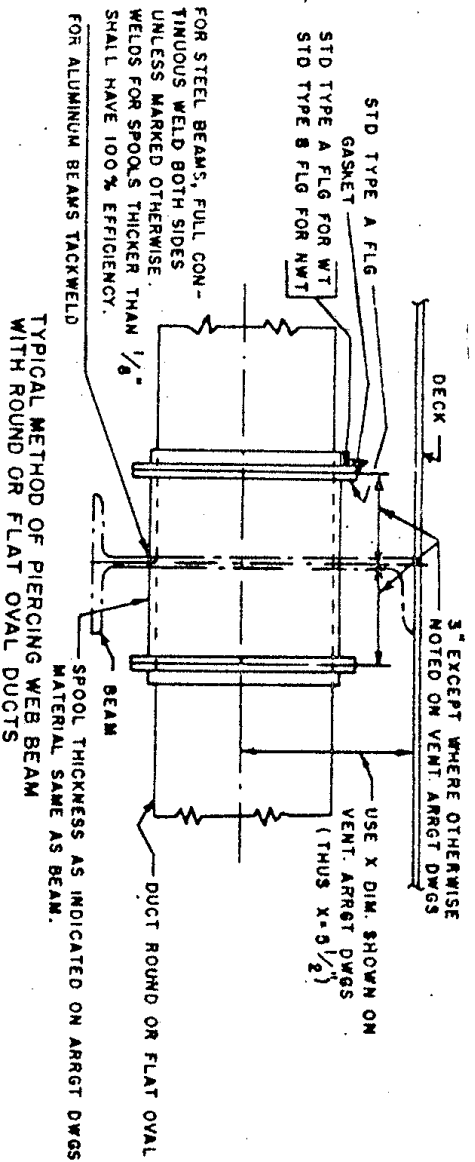


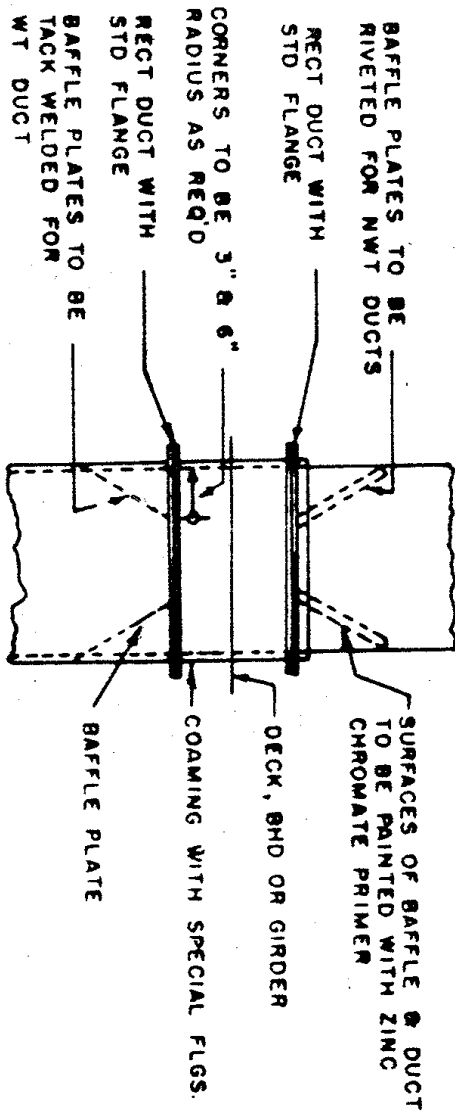
SECTION "A-A"

ELBOW WITH SPLITTERS

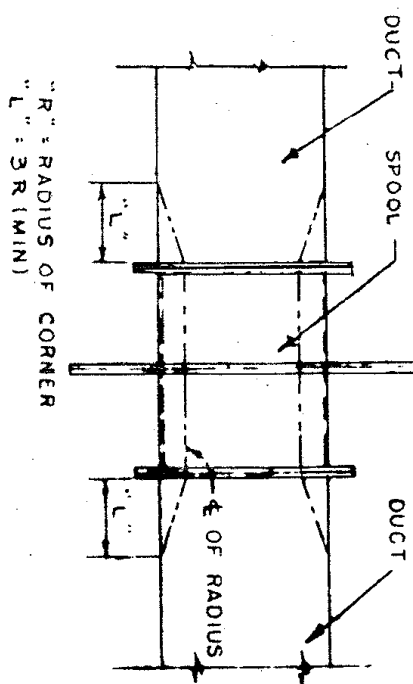


TYPICAL METHOD FOR FITTING SPOOLS
FOR DUCTS PIERCING STRUCTURAL BHDs & DECKs

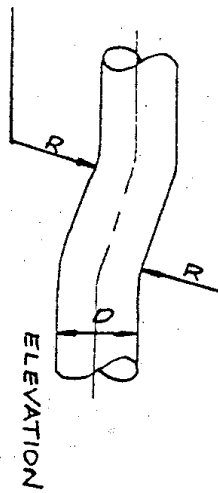




ALTERNATE METHOD

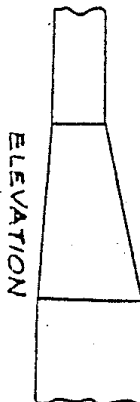
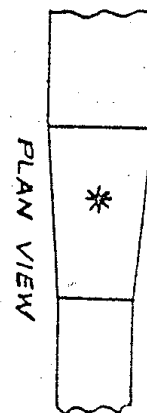


METHOD OF CONNECTING RADIUS
CORNER SPOOLS TO RECTANGULAR DUCTS

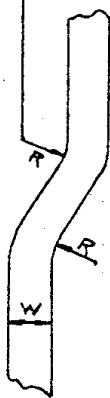


"R" SAME AS "D"
UNLESS NOTED
OTHERWISE ON
ARRGT. PLAN
SEE NOTE BELOW

ROUND DUCT



CHANGE IN LEVEL WITH
CHANGE IN SHAPE

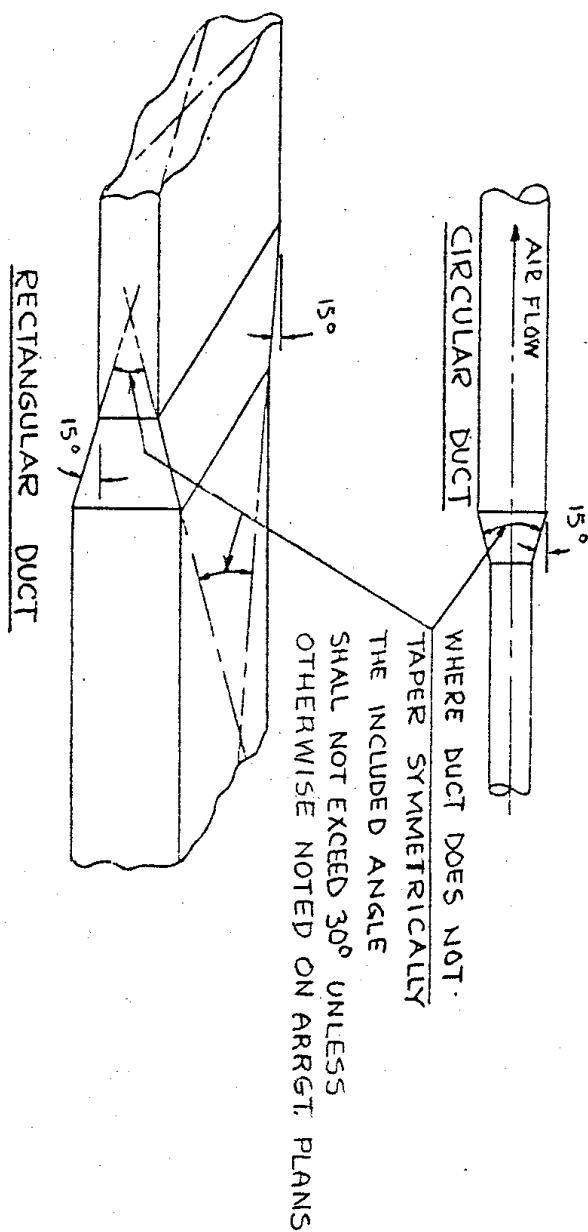


"R" SAME AS "W"
UNLESS NOTED
OTHERWISE ON
ARRGT. PLAN
SEE NOTE BELOW.

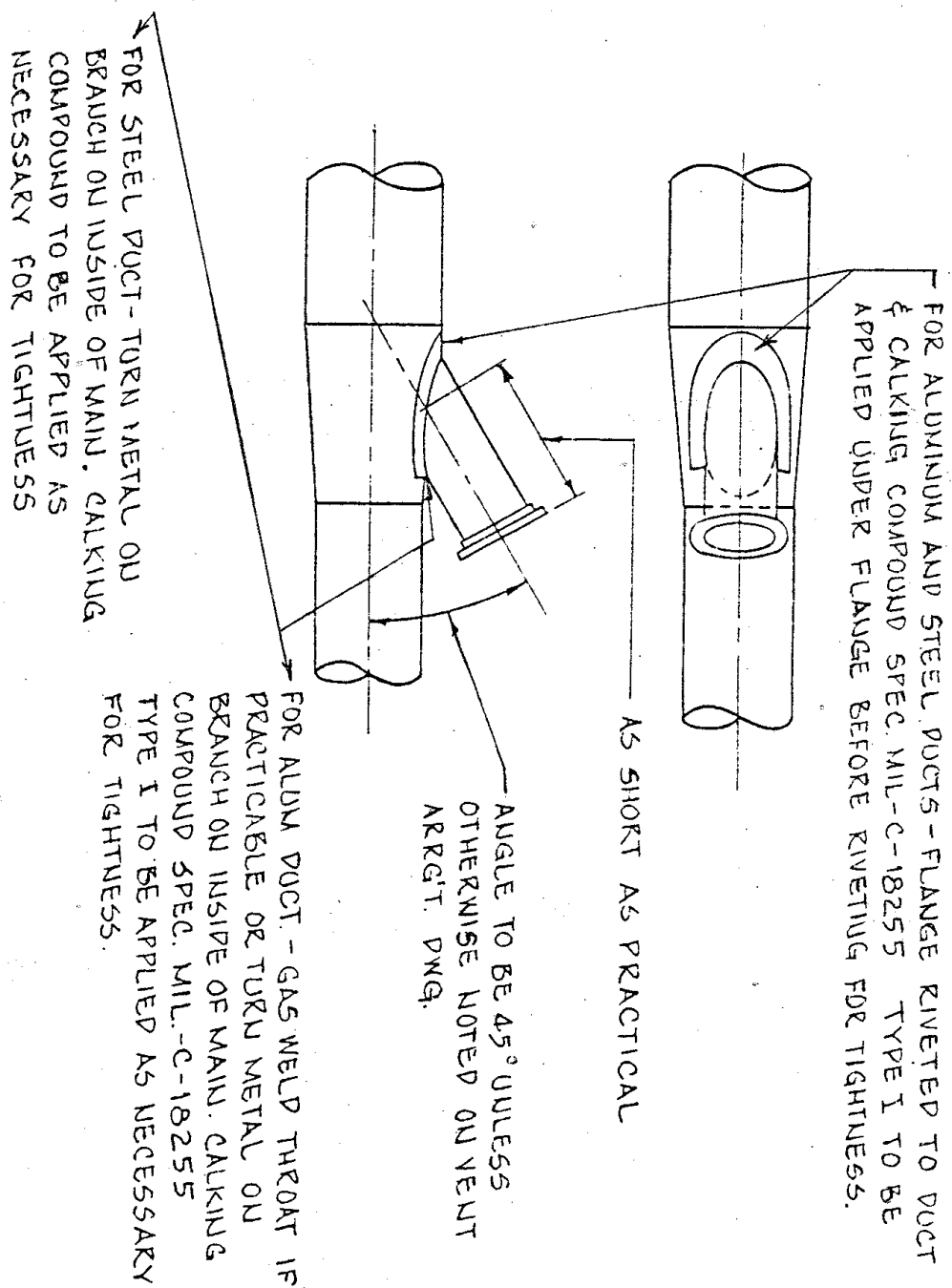
RECTANGULAR DUCT

DETAIL SHOWING USE OF *

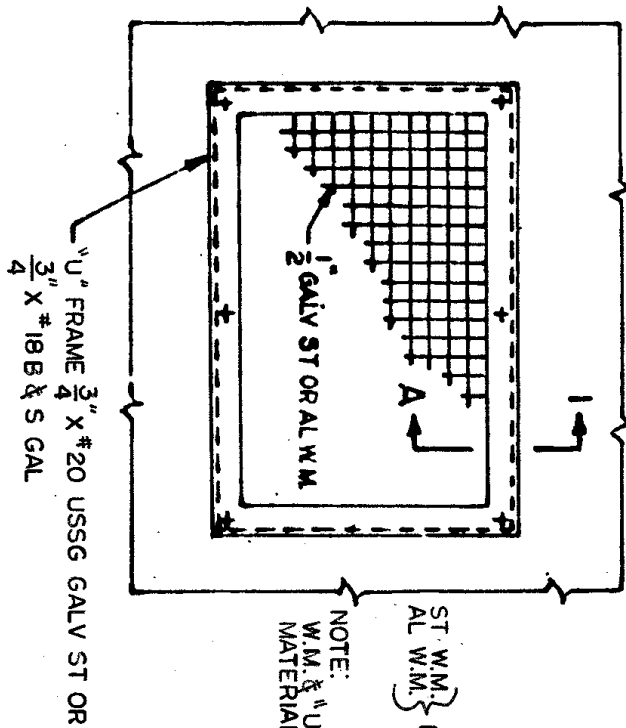
NOTE:- RADIUS IS NOT REQUIRED, A MITRE JOINT IS PERMISSIBLE WHERE
ANGLE OF OFFSET IS 15 DEGREES OR LESS.



DETAIL SHOWING ANGLE OF SLOPE FOR
CHANGE IN SIZE OR SHAPE



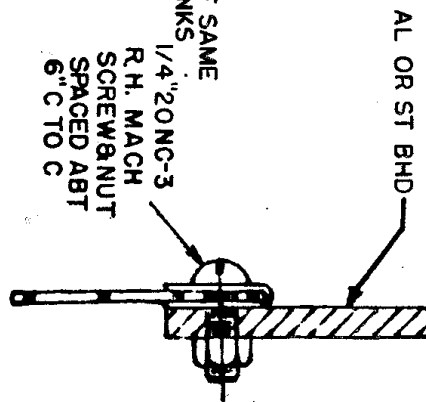
DETAIL OF BRANCH TAKE OFF (N.W.T.)



ST. W.M. } RR-W-360
AL W.M. }

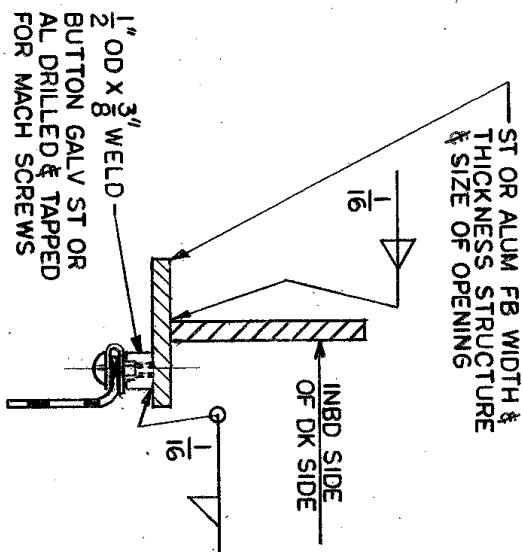
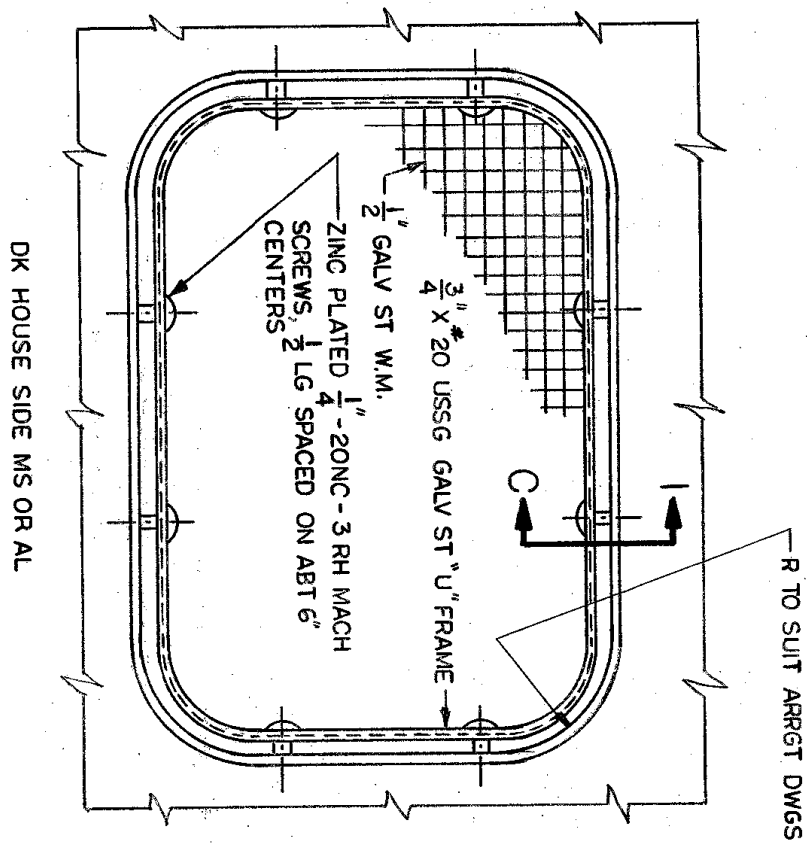
NOTE:
W.M. & "U" FRAME TO BE OF SAME
MATERIAL AS BHD OR TRUNKS

1/4" 20NC-3
R.H. MACH
SCREW & NUT
SPACED ABT
6" C TO C



SECT. 1-A

TYPICAL W.M. SCREEN FOR CUTS IN NWT BHD



SECT "1-C"

NOTES:

1. USE CRES MACH SCREWS WHEN WELD BUTTONS ARE AL

2. BRAZE W.M. TO "U" FRAME

SPECIFICATIONS

ST WIRE MESH - RR-W-360

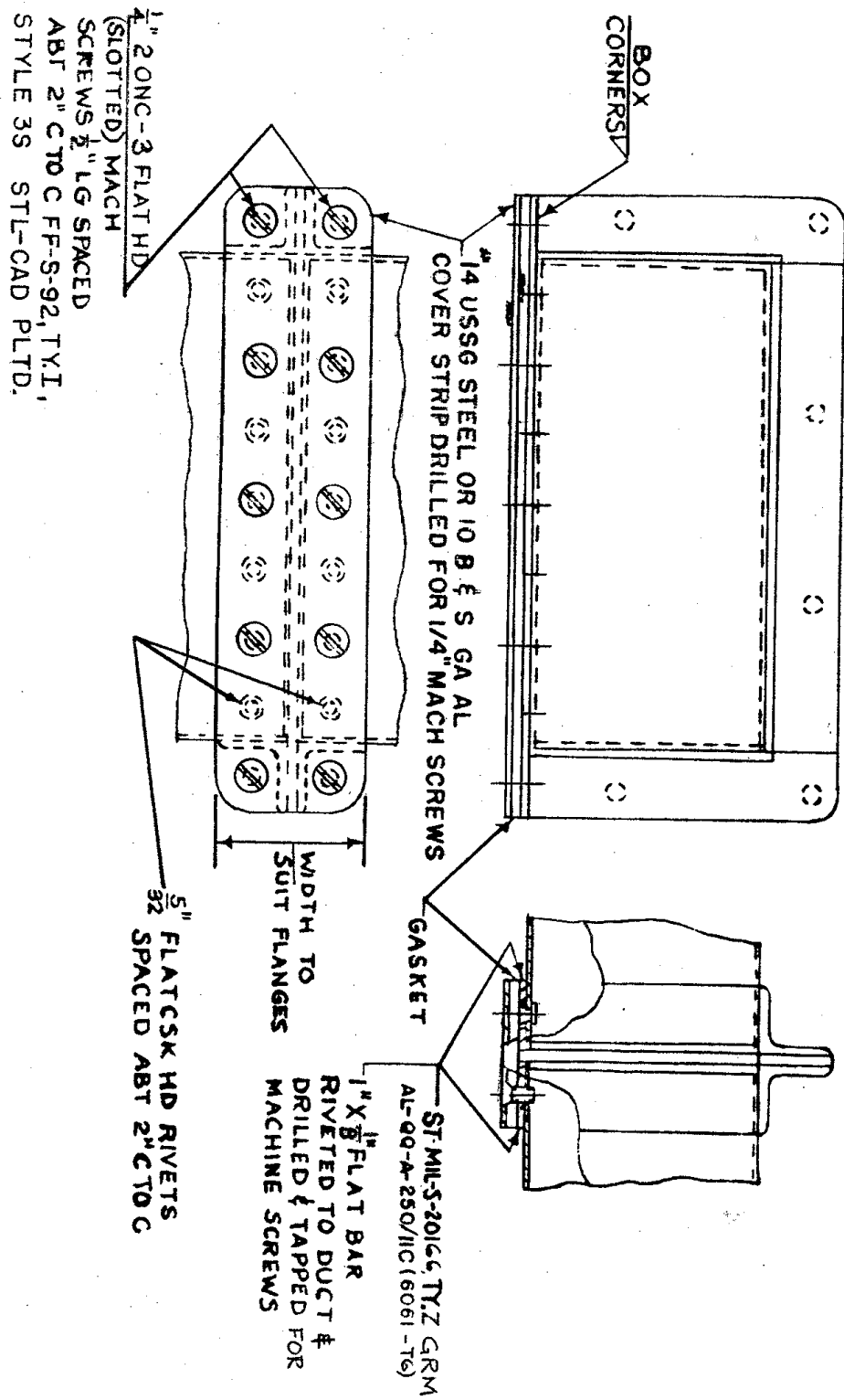
ST WELD BUTTON - ML-S-20166 TY. Z GR. M

AL WELD BUTTON - QQ-A-200/7b (5456)

ST FLAT BAR - ML-S-20166 TY. Z GR. M

ST FLAT BAR - QQ-A-200/7b (5456)

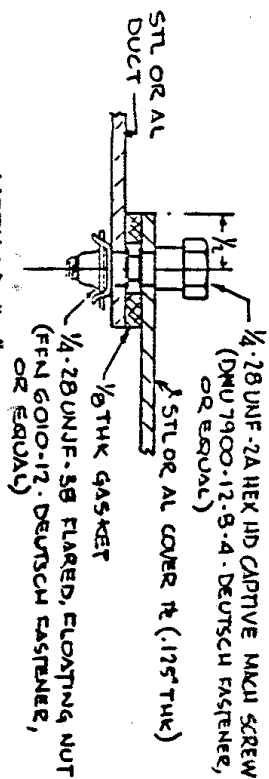
TYPICAL W.M. SCREEN IN DECK HOUSE SIDE



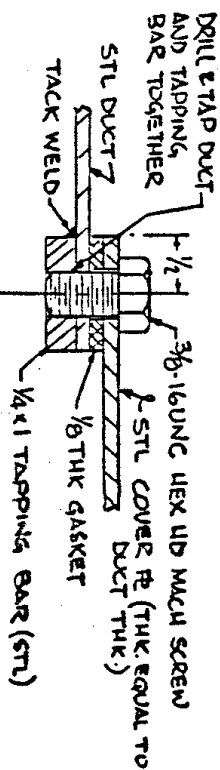
METHOD OF ALTERING FLANGED CONNECTIONS TO GAIN HEADROOM

NOTES:

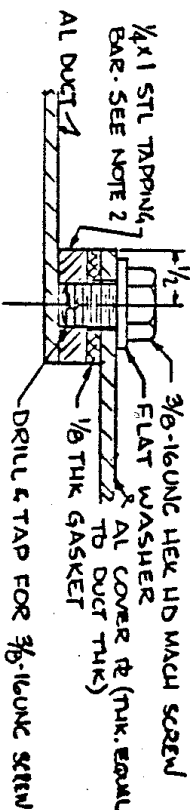
1. ACCESS PLATES FOR WT AND NWT STEEL OR ALUMINUM DUCTWORK SHALL BE INSTALLED AS SHOWN IN METHODS "A", "B" OR "C".
2. TAPPING BAR FOR USE ON WT ALUMINUM DUCTWORK SHALL BE INSTALLED AS FOLLOWS:
 - (a) DRILL TAPPING BAR & DUCT WALL FOR RIVETING, ON APPROX. 2" CENTERS. COUNTERSINK RIVET HOLES TO PROVIDE FLUSH SURFACE BETWEEN GASKET & TAPPING BAR.
 - (b) ASSURE THAT FAYING SURFACES ARE CLEAN AND DRY. COAT TAPPING BAR FAYING SURFACE WITH SILASTIC RTV-731 SEALER.
 - (c) SECURE TAPPING BAR TO THE DUCT BY RIVETING AND WIPE AWAY EXCESS SEALER.
3. SPACING OF FASTENERS SHALL BE ABOUT 3" O.C. FOR NWT COVERS AND ABOUT 2" O.C. FOR WT AND AT (PRESSURE TESTED) COVERS. FASTENERS SHALL BE PLACED AT THE CORNERS OF NON-ROUND COVERS.
4. SIZE OF ACCESS OPENING AND COVER PLATE SHALL BE IN ACCORDANCE WITH AND INFORMATION GIVEN ON ARR. DWG.



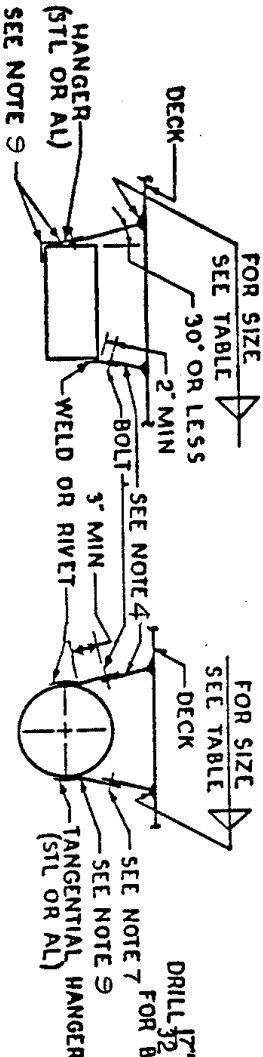
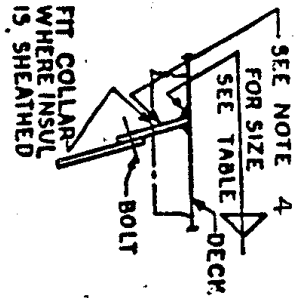
METHOD "A"
FOR USE ON NWT DUCT



METHOD "B"
FOR USE ON STEEL WT DUCT

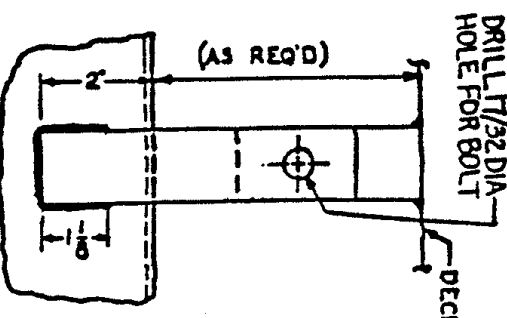
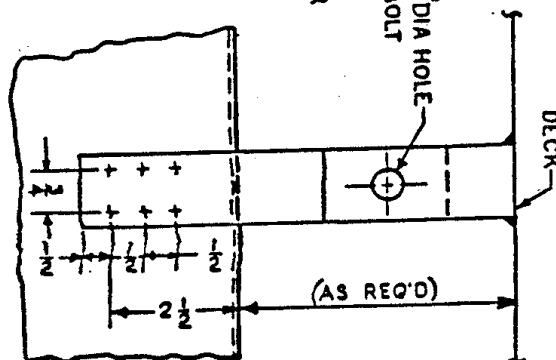


METHOD "C"
FOR USE ON ALUMINUM WT DUCT



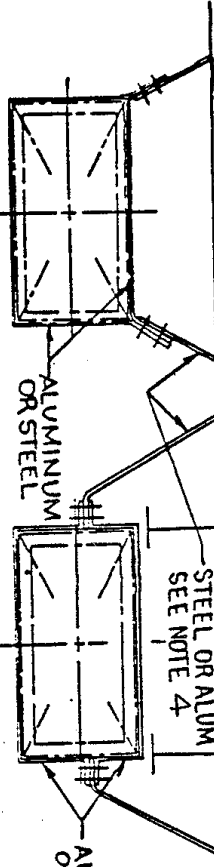
FOR WT & NWT DUCTS
RECT

FOR ALL WT & NWT
ROUND & E.O. DUCTS



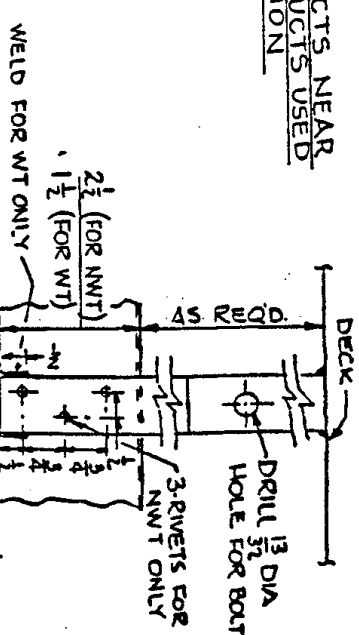
DETAIL-HANGER #3

FOR RECTANGULAR DUCTS



DETAIL-HANGER #2

FOR RECTANGULAR DUCTS NEAR
STRUCTURE OR FOR DUCTS USED
AS A PORTABLE SECTION



DETAIL-HANGER #4

HANGERS FOR DUCTWORK
SEE SHEET 33 FOR NOTES

NOTES

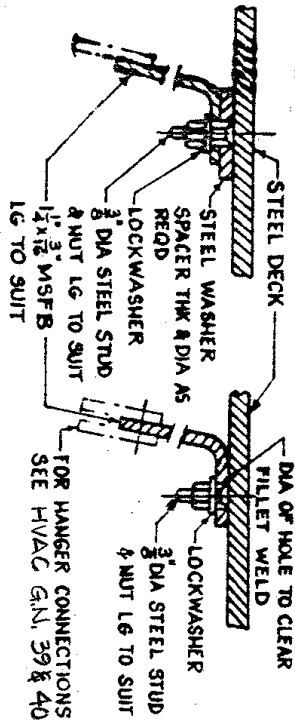
- 1 WHERE WATERTIGHT DUCTWORK IS NOT PORTABLE, HANGERS WILL BE ONE PIECE WITHOUT BOLTS.
- 2 CONTACT SURFACE BETWEEN ALUMINUM AND STEEL SHALL BE TREATED IN ACCORDANCE WITH HVAC GENERAL NOTE NO. 59.
- 3 HANGERS NO. 1 THRU 4 SHALL BE USED AS FOLLOWS:
 HANGER NO. 1 : ALL NWT, FO AND RECTANGULAR DUCTS AND NWT ROUND OVER 12 INCHES DIAMETER.
 HANGER NO. 2 : ALL NWT DUCTS INTERNALLY SOUND INSULATED.
 HANGER NO. 3 : ALL WT DUCTS EXCEPT ROUND THRU 6 INCH DIAMETER.
 HANGER NO. 4 : ALL WT ROUND DUCTS THRU 6 INCH DIAMETER AND ALL NWT ROUND DUCTS THRU 12 INCHES DIAMETER.
- 4 HANGER STOOL SHALL BE STEEL TO QQ-A-698, WHEN ATTACHING TO STEEL STRUCTURE, AND ALUMINUM ALLOY 5456 QQ-A-200/7, WHEN ATTACHING TO ALUMINUM STRUCTURE.
- 5 IF ANGLES ARE USED IN LIEU OF FLATBAR THE LEG OF THE ANGLE CONNECTED TO THE DUCT SHALL BE EQUAL TO THE WIDTH AND THICKNESS OF THE FLATBAR GIVEN IN THE TABLE.
- 6 STEEL DUCT HANGERS SHALL BE OF STEEL TO QQ-S-698, ALUMINUM HANGERS SHALL BE ALUMINUM ALLOY 5456 QQ-A-200/7, H 111.
- 7 FOR BOLTING SEE HVAC GENERAL NOTES 39 AND 40.
- 8 RIVET HOLES IN DUCTWORK ARE NOT TO BE DRILLED OVERSIZE.
- 9 BENDING RADIOUS OF HANGER FLATBAR IS TO BE THE SAME AS THE HANGER THICKNESS.

HANGER DATA					
NO.	HANGER SIZE	STOOL SIZE	NO. RIVETS	NO. BOLTS	BOLT SIZE
1	1 1/4 X 3/16	1 1/4 X 3/16	6	1	1/2
2	1 1/4 X 3/16	1 1/4 X 3/16	-	2	1/2
3	1 1/4 X 3/16	SEE NOTE 1	-	1	1/2
4	1 X 1/8	1 X 1/8	3	1	3/8

DETAIL WITH SPACER &
WITHOUT INSULATION

ALTERNATE METHOD WITHOUT
SPACER & INSULATION

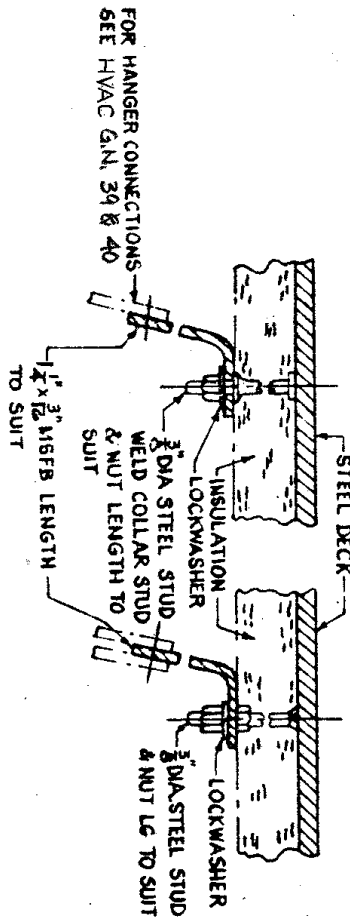
STL STUD - CONL, SAE 1010
AL STUD - CONL, ALCON ALLOY 43
LOCKWASHER - FF-W-84 CLA, STY 2



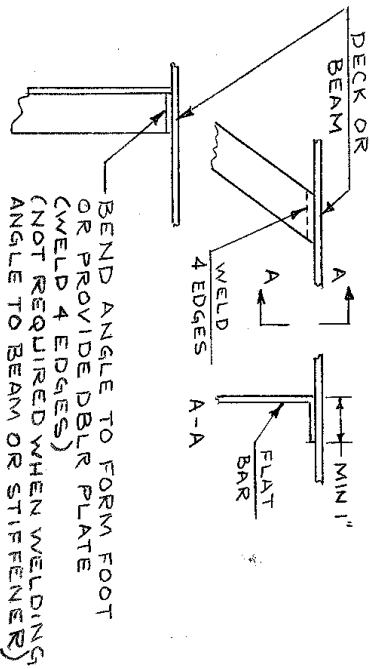
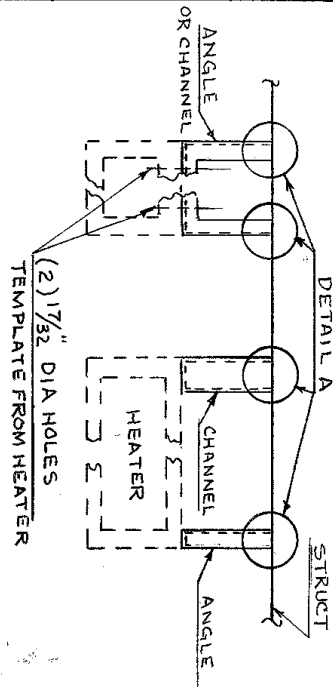
ALTERNATE METHODS OF SECURING DUCT HANGERS WITH WELDED STUDS

DETAIL WITH
INSULATION

ALTERNATE METHOD
WITH INSULATION

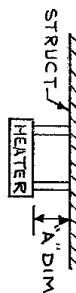


APPLICABLE CONNECTION



DETAIL A

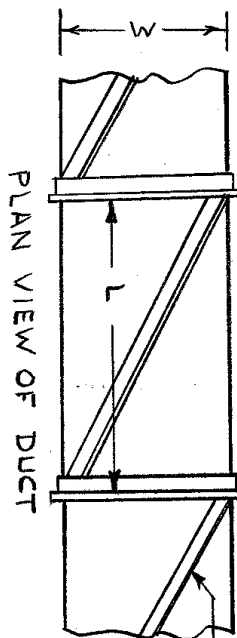
HANGERS FOR DUCT TYPE HEATERS



HEATER SIZE	MAXIMUM "A" DIMENSION HANGERS				STEEL HANGERS			
	1 1/2 x 1 1/2 x 1/4	2 x 2 x 1/4	2 x 2 x 1/4	3 x 3 x 1/4	1 1/2 x 1 1/2 x 1/4	2 x 2 x 1/4	2 x 2 x 1/4	3 x 3 x 1/4
21	50				50			
22	50				50			
23	49	50			50			
24	43	50			50			
25	28	41	50		42	50		
26	12	19	27	38	50			
27	8	13	20	28	50			
28	5	9	15	22	50			
29	1	5	10	16	45			
30	0	2	6	11	37			
31		3	7	11	36			
32		0	3	7	31			
33			1	5	24			
34			0	3	20			
35				0	12			
36					11			
37				0				
38								

DUCT HEATER HANGERS

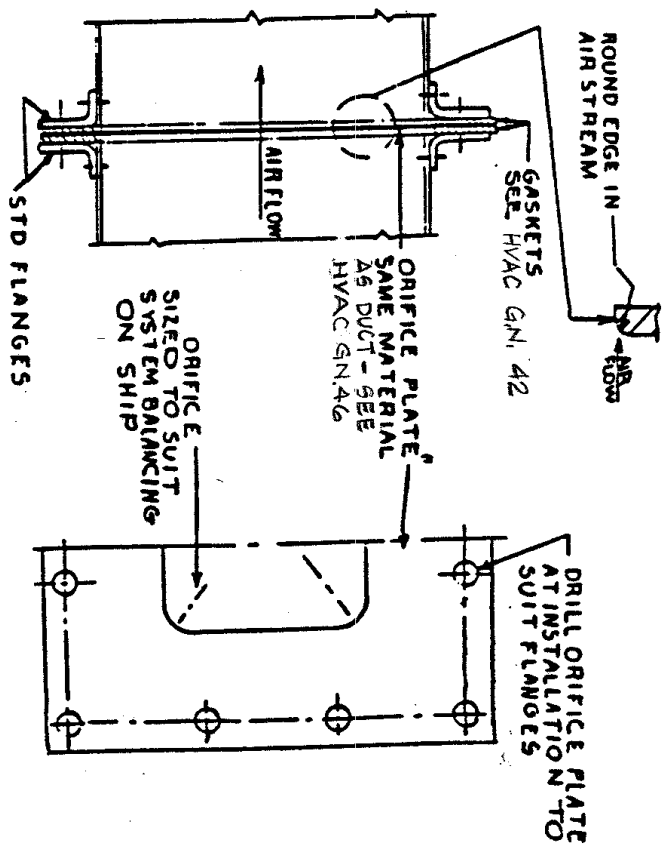
1" X 1" X 1/8" ANGLES RIVETED OR
WELDED AROUND DUCT AS NECESSARY



L = NOT GREATER
THAN 2w

DUCT PANEL STIFFENER

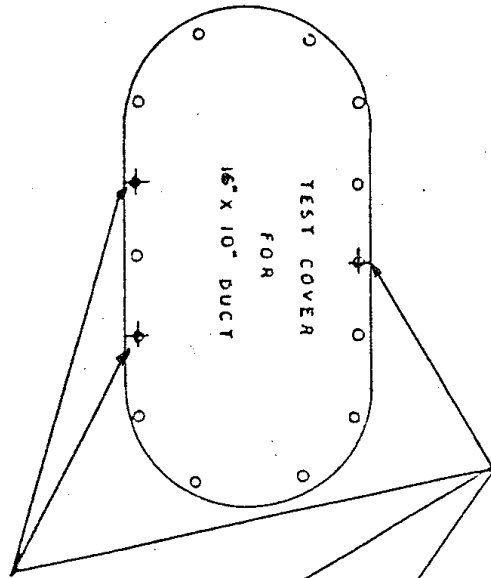
1" X 1" X 1/8" ANGLES DIAGONAL
STIFFENERS AS NECESSARY
RIVETED OR WELDED TO TOP
AND BOTTOM OF DUCT.
INTERNAL STIFFENERS
NOT PERMITTED.
STIFFENERS TO BE THE
SAME MATERIAL AS
DUCTWORK.



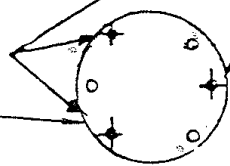
ORIFICE PLATE
TYPICAL FOR RECT. DUCT SHOWN
ROUND DUCT SIMILAR W/ROUND ORIFICE.

INSTALL THREE STOWAGE BOLTS PER COVER- SEE BELOW

TYPICAL DETAIL FOR LABELLING
PORTABLE TEST COVERS



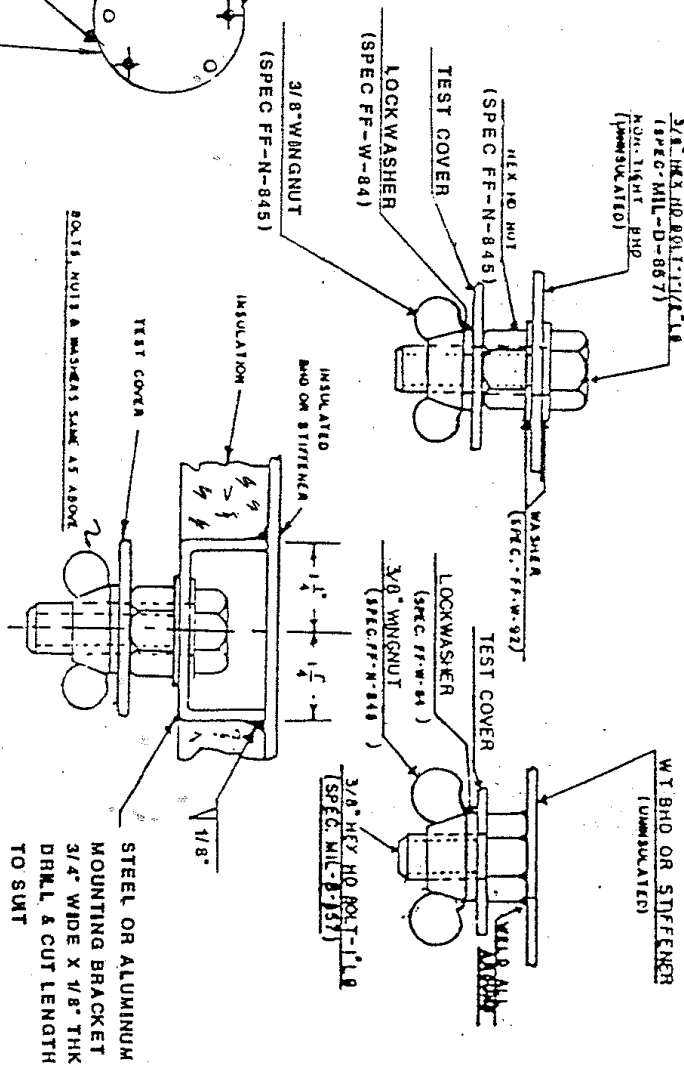
TEST COVER FOR
3" DIA DUCT

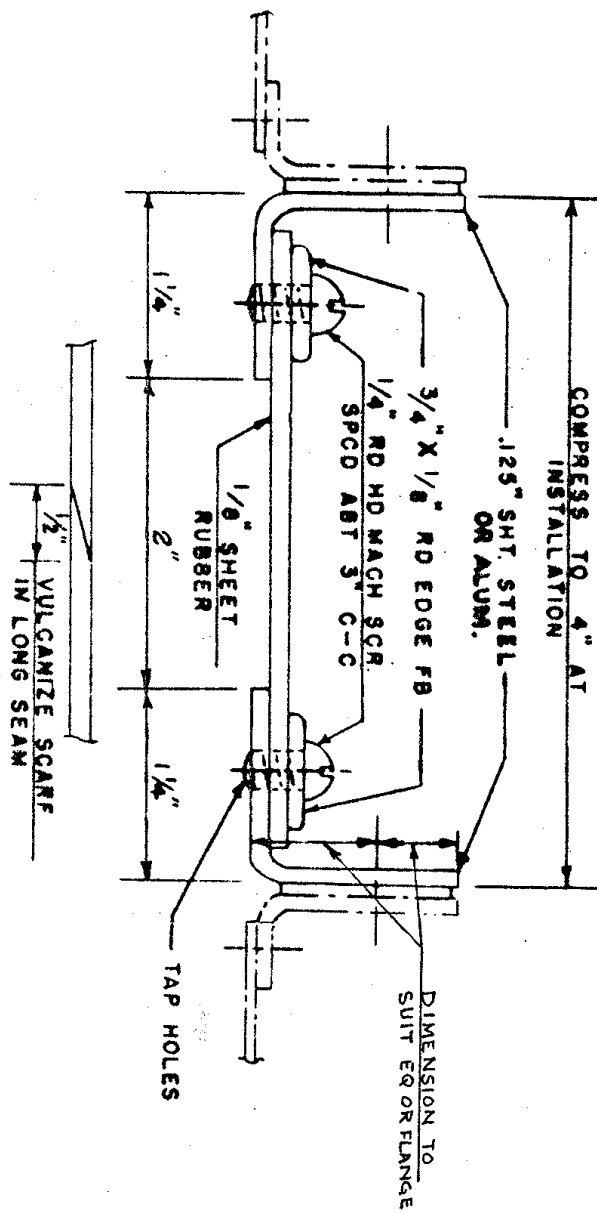


METHOD OF STOWING TEST COVERS

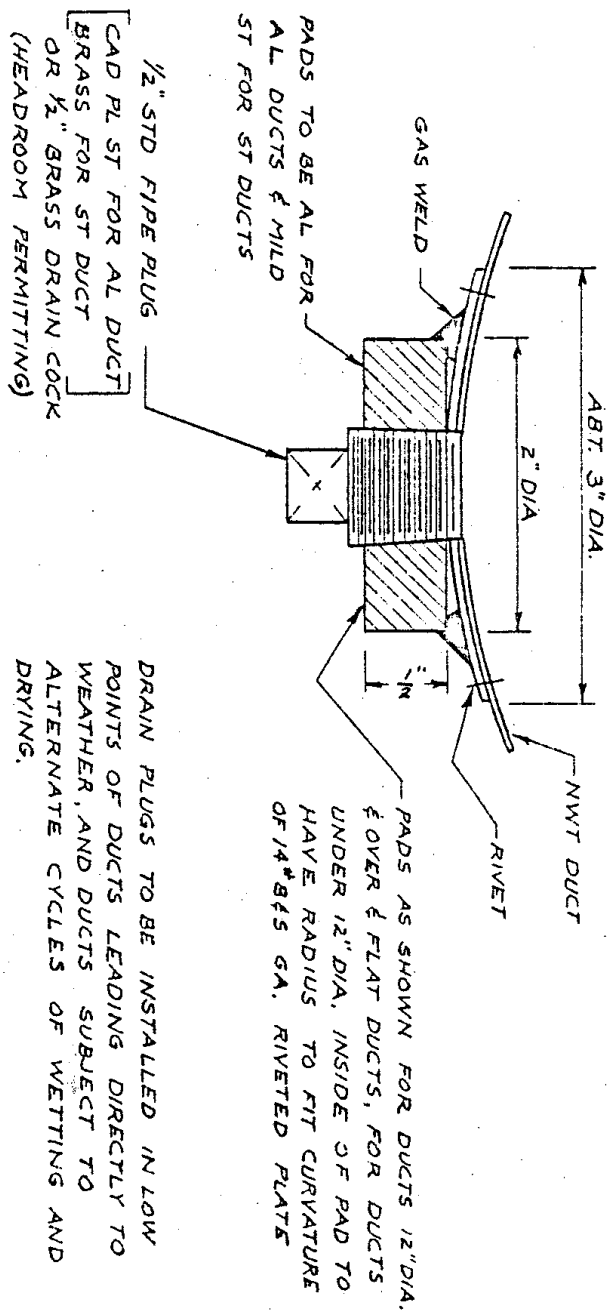
NO SCALE

NOTE: MATERIAL OF BOLTS, NUTS & WASHERS TO BE STEEL.
CADMIUM PLATED OR GALVANIZED USE THREE PER COVER.

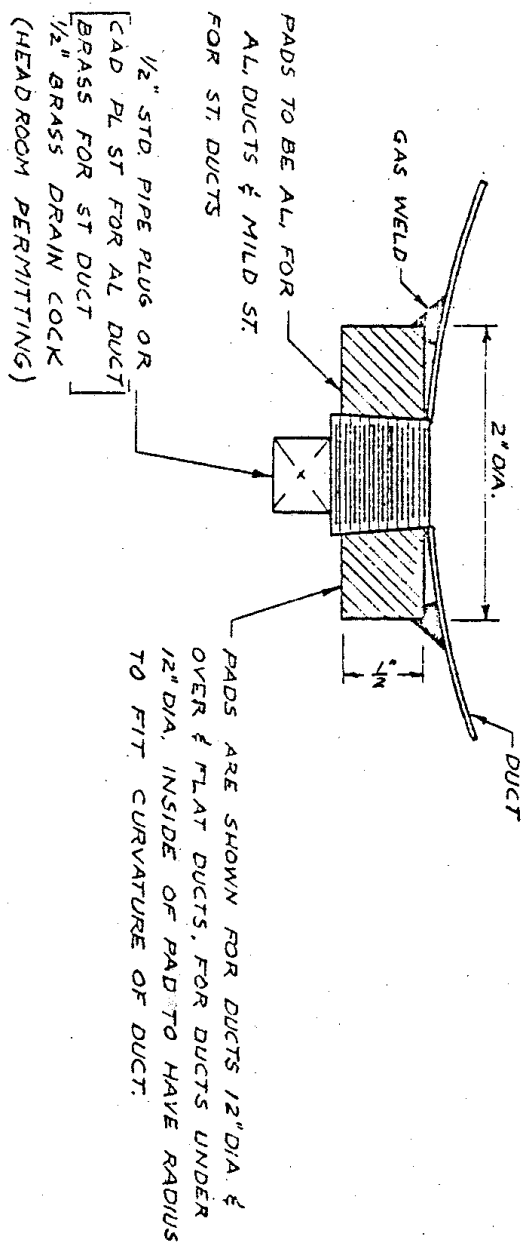




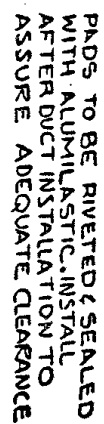
NWT VENT. DUCT FLEXIBLE CONNECTION



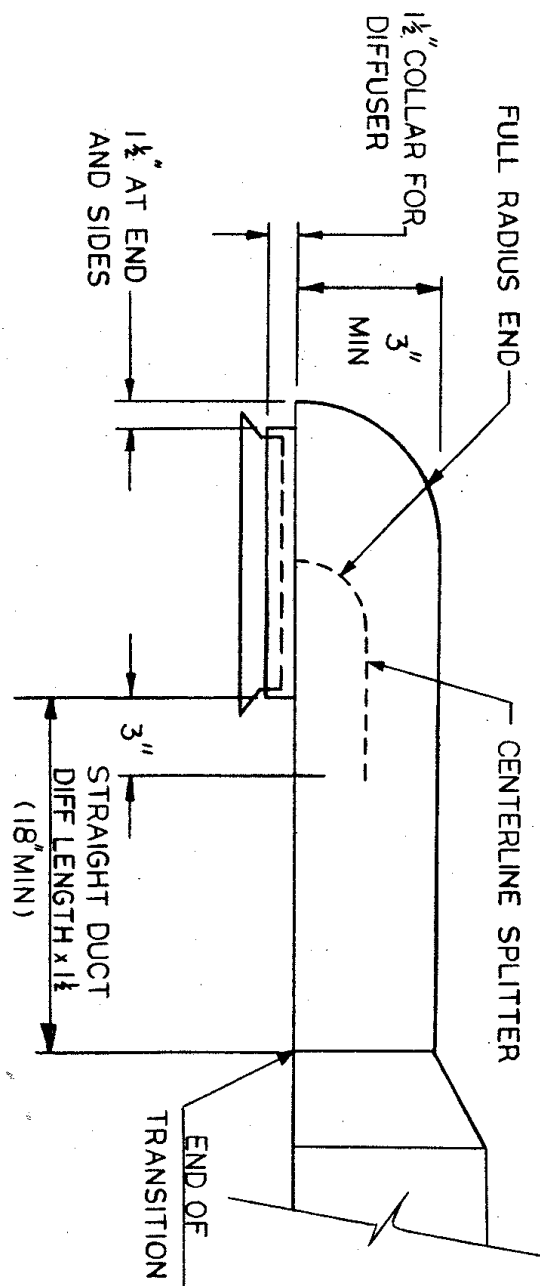
DETAIL OF DRAIN FOR NWT DUCTS



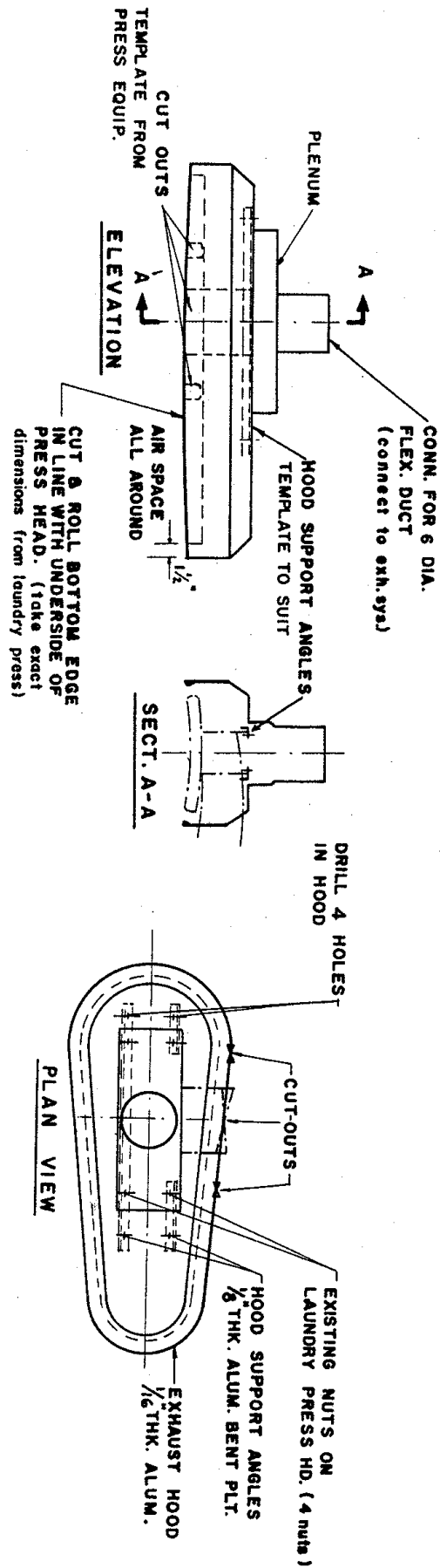
DETAIL OF DRAIN FOR WT DUCTS



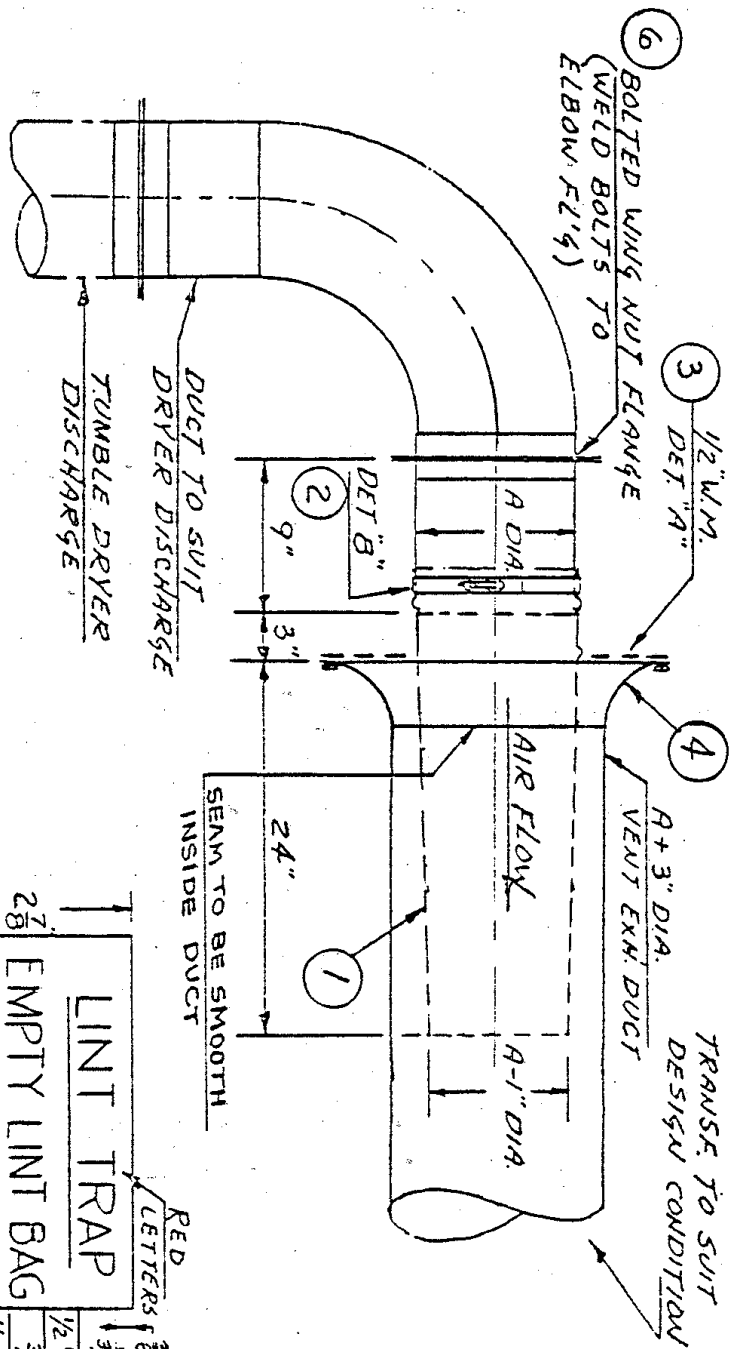
STD-501-6265454 REV -



TYPICAL DIFFUSING TERMINAL INSTALLATION NO SCALE



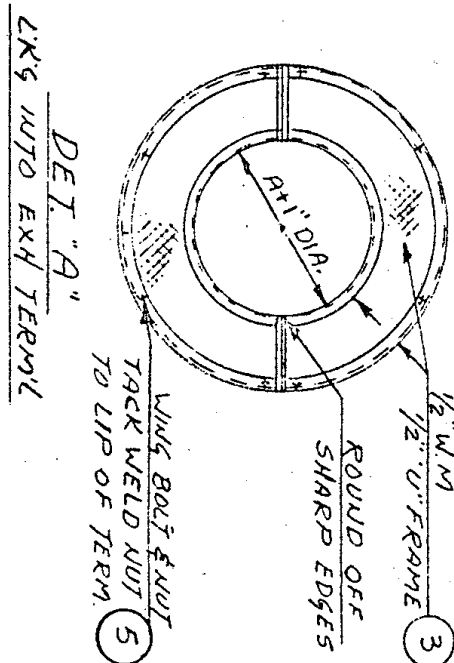
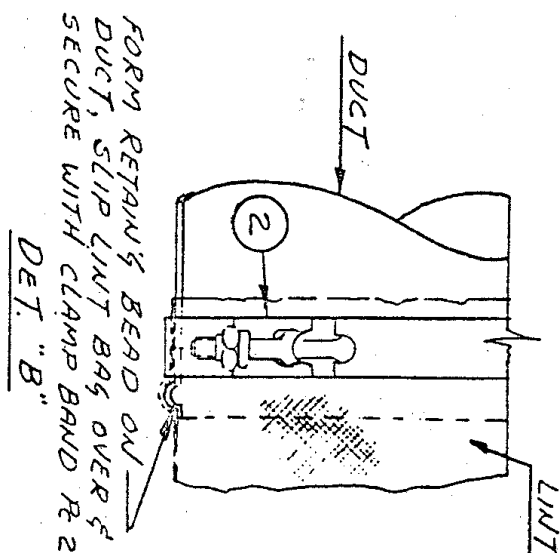
EXHAUST HOOD FOR LAUNDRY PRESS



NOTE:
HEIGHT OF DUCT TO BE SUFFICIENT TO CLEAR
HEADROOM, BUT NO MORE THAN 7'-6" ABV DECK.

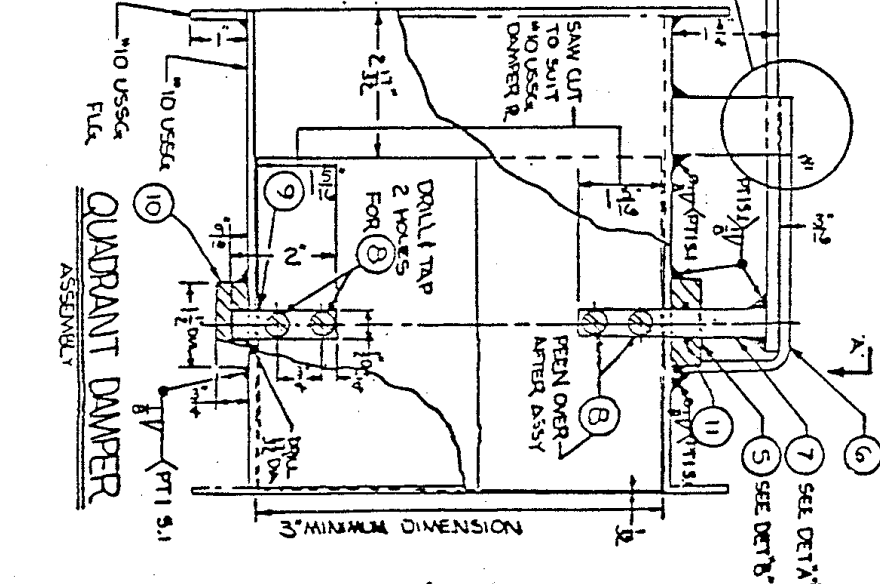
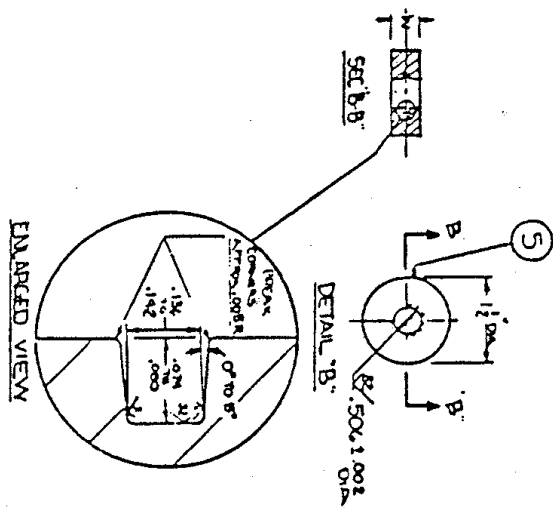
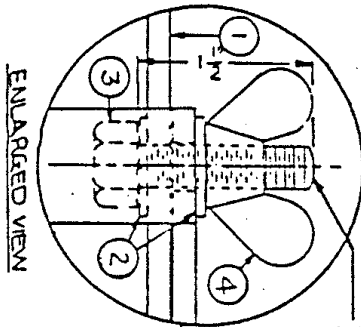
LINT TRAP ASSEMBLY

TYPICAL DETAIL OF LINT TRAP FOR
LAUNDRY TUMBLER DRYER

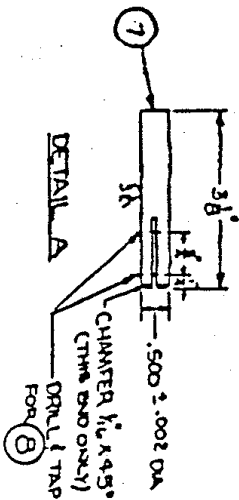
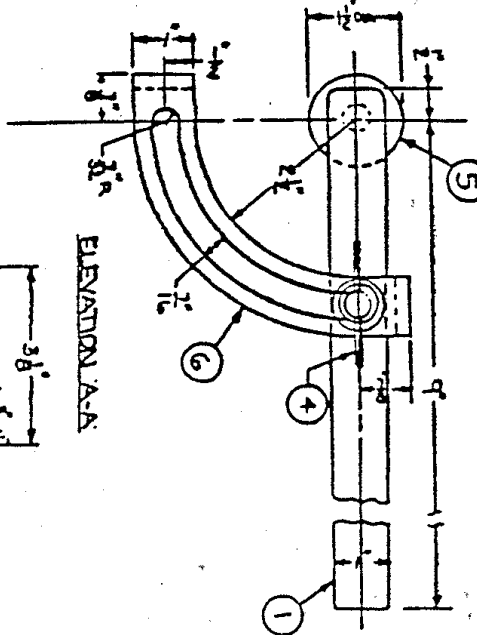


DETAILS OF LINT TRAP

LIST OF MATERIAL					REMARKS
ANNO	DESCRIPTION	QUAN.	MAT'L	SPEC	
1	LINT BAG TRAP	1	NYLON	MIL-C-3395	SIM. MARQUISSETTE NYLON 40 MESH
2	BAND CLAMP	1	STL	COMM	SIM. AERODUP CORP MARQUISSETTE
3	1/2" W.M. (COMPLETE WITH "U" FR)	1	MISC	MISC	IN HALVES
4	TERMINAL, TYPE "D"	1	ALUM	QQ-A-73016	REF. #2
5	WING BOLT & NUT	AS REQ	MISC	MISC	1/4" 20 x 1 1/2"
6	FLANGE	2	MISC	MISC	REF. #1
7	LABEL PLATE	1	ALUMINUM	MIL-F-15024	INSCRIBED AS SHOWN

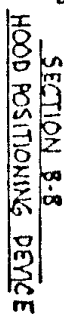
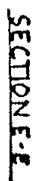
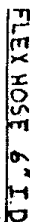
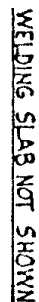
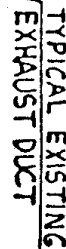


ITEM	DESCRIPTION	QTY PER ASSEMBLY	MATERIAL	SPEC	REMARKS
1	QUADRANT LEVER	1	STEEL	Q&A-40 3/8" x 1" PD	
2	WASHER	2	BRASS	Q&A-47 3/8" I.D.	
3	BOLT	1		Q&A-48 3/8" x 1 1/2"	
4	WASHER	1	STEEL	Q&A-49 3/8" x 1 1/2"	
5	BEARING	1	STEEL	Q&A-50 5/16" x 1"	
6	QUADRANT	1	STEEL	Q&A-51 3/8" x 1"	
7	DAMPER SHAFT	1	STEEL	Q&A-52 1/2" DIA x 14"	
8	SCREWS	4	STEEL	Q&A-53 1/2" DIA x 14"	
9	DAMPER SHAFT	1	STEEL	Q&A-54 1/2" DIA x 14"	
10	BEARING	1	STEEL	Q&A-55 5/16" x 1"	
11	O-RING	1	RUBBER	Q&A-56 3/8" x 1/2" x 1/8"	



NOTES:
1. MINIMUM DAMPER SIZE TO BE 7"x3"
2. DAMPER BLADE TO BE 1/4" LESS THAN INSIDE DAMPER DIMENSION

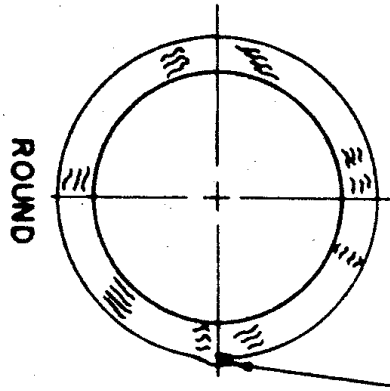
QUADRANT DAMPER (RECT) A.T. CASING
SUITABLE FOR GRADE "A" SHOCK



EXHAUST TERMINAL AND TYPICAL DUCT ARRANGEMENT FOR WELDING SLAB

- STD-501-6265454 REV -

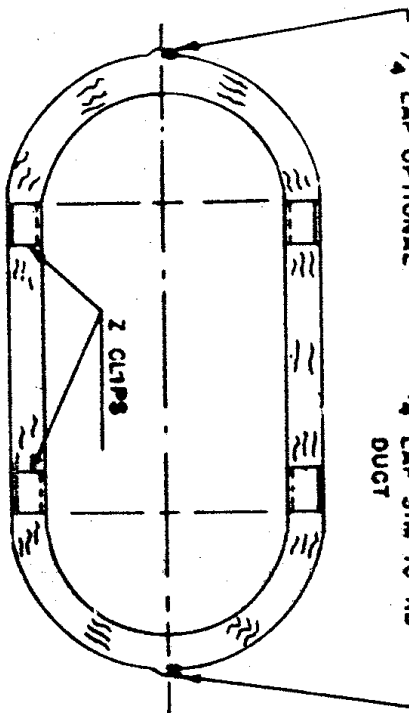
$\frac{3}{4}$ " LAP-RIVETED WITH BLIND
RIVETS SPACED $1\frac{1}{2}$ " C TO C



ROUND

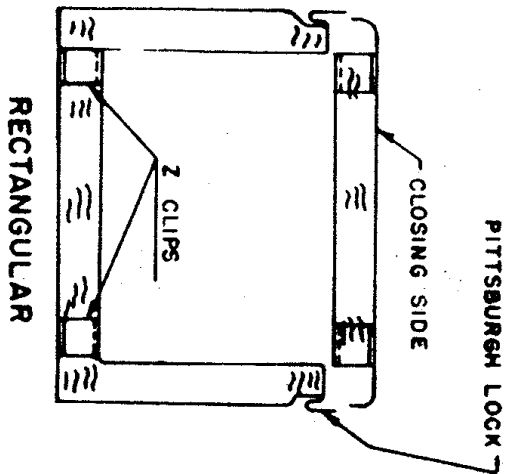
$\frac{3}{4}$ " LAP OPTIONAL

$\frac{3}{4}$ " LAP SIM TO RD
DUCT



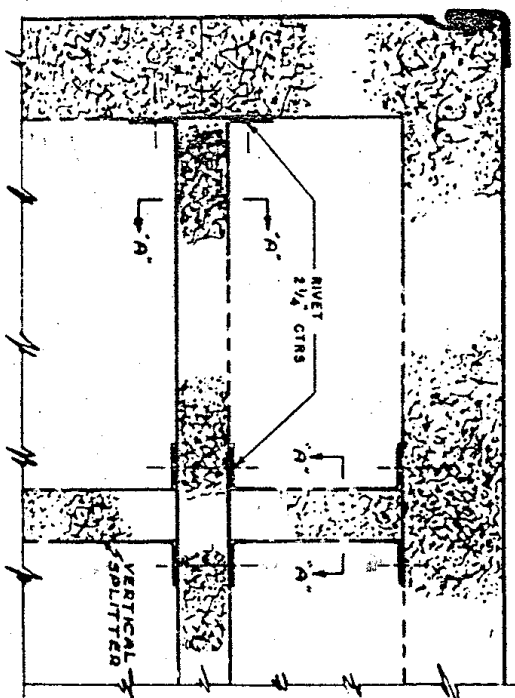
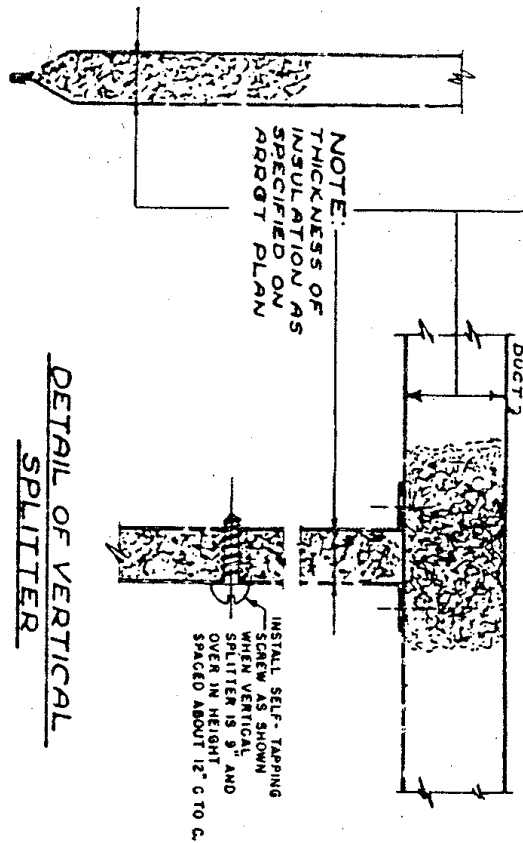
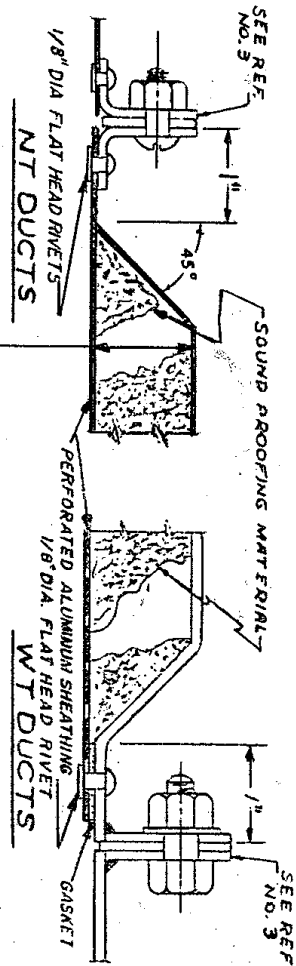
FLAT OVAL

NOTE: WHEN DUCTS ARE REQUIRED TO BE
WATERTIGHT THE LAP SHALL BE
BUTTERED WITH AN APPROVED
SEALING COMPOUND BEFORE
RIVETING.



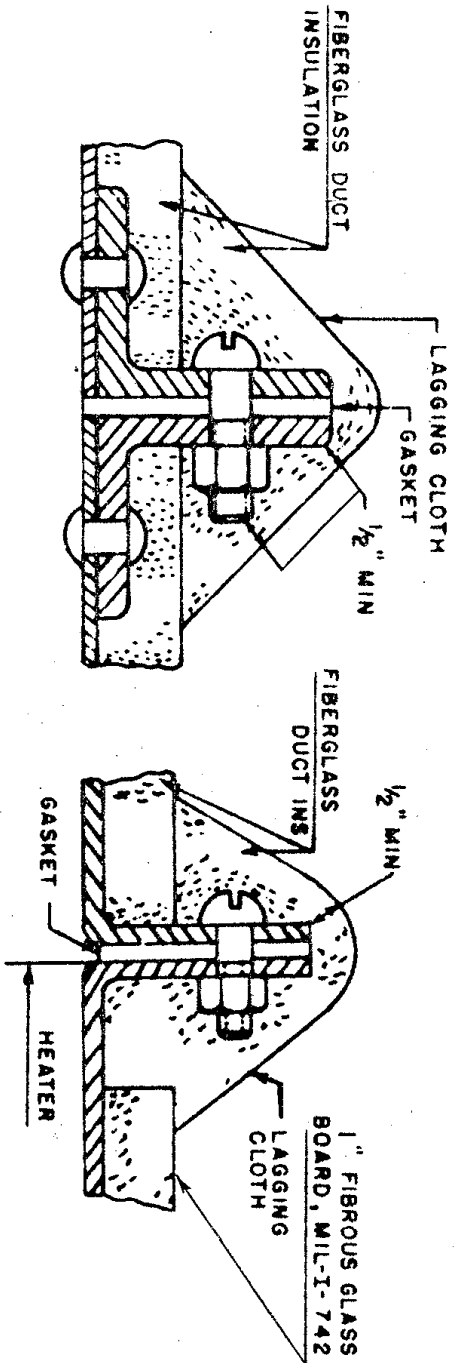
RECTANGULAR

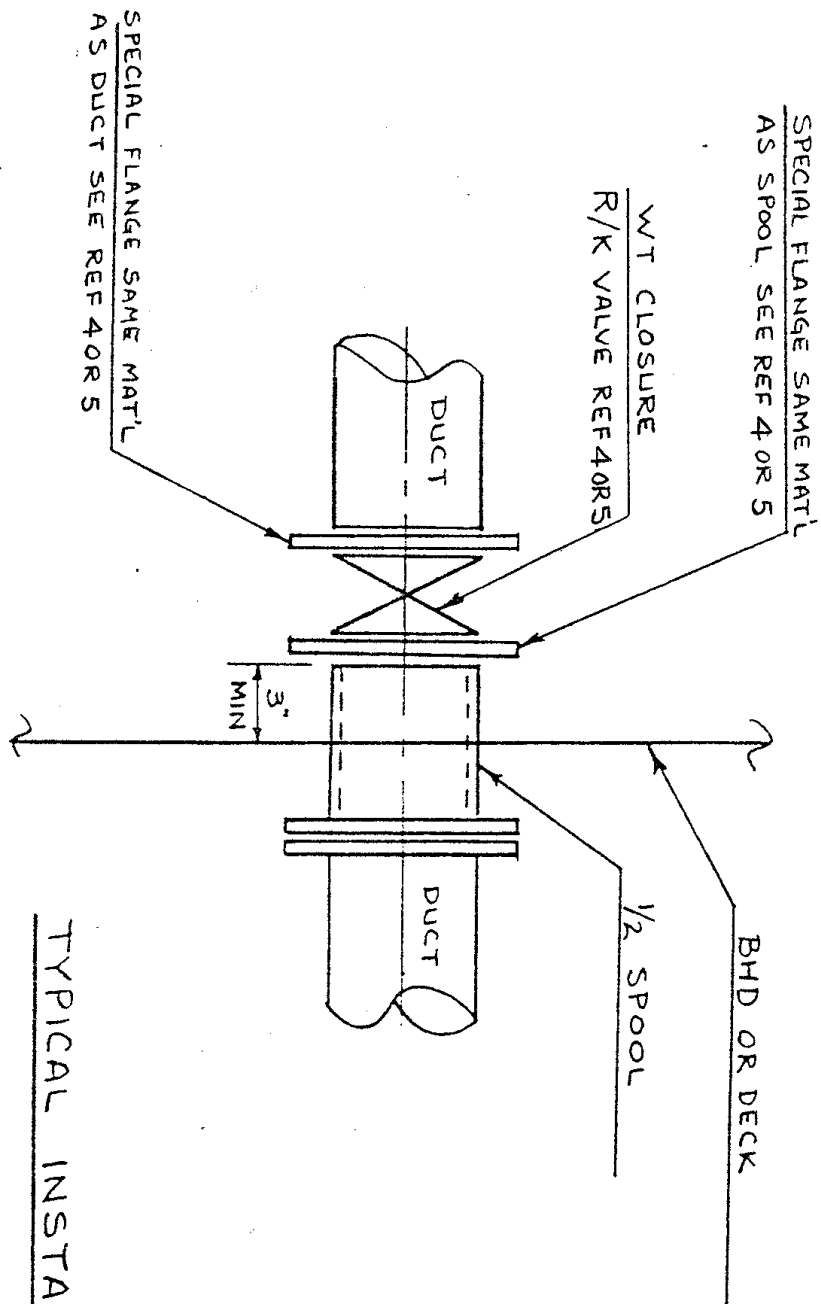
METHOD OF INSTALLING SOUND
INSULATION IN DUCTS



METHOD OF SOUND PROOFING DUCTS

THERMAL INSULATION OF FLANGES AND HEATERS IN DUCTS
 (N.W.T. SHOWN — W.T. SIMILAR)





TYPICAL INSTALLATION
WT CLOSURE
MODEL "R" AND "K"